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ATR-72(7231)-1, VOLUME II

Integrated Operations / Payloads / Fleet Analysis Final Report

Volume II: Payloads

Prepared by ADVANCED VEHICLE SYSTEMS DIRECTORATE
Systems Planning Division

August 1971

Prepared for OFFICE OF MANNED SPACE FLIGHT
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Washington, D. C.

Contract No. NASW-2129

Systems Engineering Operations
THE AEROSPACE CORPORATION

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ATR-72(7231)-1
Volume II

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Advanced Vehicle Systems Directorate
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INTEGRATED OPERATIONS/PAYLOADS/FLEET ANALYSIS
FINAL REPORT
Volume II: Payloads

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FOREWORD

This is part of a six-volume Aerospace Corporation Final Report on Study A of NASA Contract NASW-2129, Integrated Operations/Payloads/ Fleet Analysis. The report comprises the following volumes:

Volume I:	Summary
Volume II:	Payloads
Volume III:	System Costs
Volume IV:	Launch Systems
Volume V:	Mission, Capture and Operations Analysis
Volume VI:	Classified Addendum*

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* Classified Data, Contained in Volume VI, Classified Addendum

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TABLES

* Classified, In Volume VI.

FIGURES

1. INTRODUCTION*

The Aerospace Corporation Integrated Operations/Payloads/Fleet Analysis represents the primary data source for Mathematica's Economic Analysis of the NASA Space Shuttle program. This volume describes the payload design data that were used for the Integrated Operations/Payloads/Fleet Analysis. Payload cost estimates for the designs described in this volume are found in Volume III. The integration of the payloads described in this volume with launch vehicles from each of the launch vehicle fleets is described in Volume V.

Payload is defined as that portion of the space mission that is placed into orbit. The payload consists of mission equipment (experiments) and supporting subsystems (spacecraft) but excludes launch vehicle related elements.

The launch vehicles considered in this study include expendable vehicle fleets and a reusable Space Shuttle fleet. The expendable launch vehicles are represented by the current launch vehicle fleet (Scout, Delta, Atlas, Titan, Agena, Centaur, etc.) and the low cost expendable launch vehicle fleet (Scout and Titan family and an upper stage, including growth versions). The reusable launch vehicle is comprised of the Space Shuttle and Space Tug, and is commonly called the "Space Transportation System."

The Space Shuttle has two stages, the booster and orbiter, both of which can reenter and land like an aircraft. The Space Shuttle payload includes everything transported in the orbiter payload bay. The orbiter will provide payload tie-points and a standardized deployment mechanism. When the Space Shuttle payload includes a Space Tug (high energy upper stage), the Space Tug is a transportation device with its own payload. Thus, in this study the general term "payload" reflects any device being transported to its mission destination, such as satellites, probes, space station, lunar stations, logistics cargos, and planetary orbiters and landers. The Space Tug provides the additional energy required for the higher energy orbits (e.g.,

*All costs quoted are in terms of 1970 dollars

synchronous) and escape missions (planetary). Most of the effort on payloads in this study has been on earth satellites, probes, and planetary missions because of the applicability of the "payload effects." Payload effects make use of the Space Shuttle's ability to retrieve payloads for repair, overhaul, and maintenance as well as the relaxed payload weight and volume constraints and lower launch costs.

The payloads include the proposed NASA, non-NASA, and DoD missions. The NASA and non-NASA payloads are summarized in this volume; however, the detailed data on mission equipment, system description, and subsystem are documented in Reference 1. The DoD payloads data are described in Volume VI of this report. The payload data have also been computerized to permit direct use in the cost analysis, and to permit data to be kept current for rapid access use without making changes to the Data Book. Printouts of the payload data for payloads selected for each program or mission in this Integrated Fleet Analysis are shown in Appendix 4.

Four types of payloads were analyzed:

1. Current Expendable Payload - A payload using the current design approach and intended for use with expendable launch vehicles.
2. Current Reusable Payload - A current expendable payload adapted to reuse.
3. Low Cost Expendable Payload - A payload (satellite) using the low cost (LMSC) expendable design approach and intended for use with expendable launch vehicles.
4. Low Cost Reusable Payload - A payload (satellite) using the low cost (LMSC) reusable design approach and intended for use with the Space Shuttle/Space Tug launch and retrieval system.

2. CURRENT DESIGN, EXPENDABLE PAYLOAD DESCRIPTIONS

As part of the payload analysis, descriptions were developed for each payload. These descriptions include data required for use in the capture and cost analyses, and for the application of the LMSC low cost satellite "payload effects" data across the mission model. The level of detail describing satellite subsystems was limited to stating the type and weight of each of nine subsystems. The subsystems used to describe the satellites were: mission equipment; structures and mechanisms; electrical, guidance and navigation; propulsion; attitude control; telemetry tracking and command (TT&C)*; environmental control; and adapter (launch vehicle/payload interface structure).

For use in the capture analysis, the as-launched overall size, weight, and mean mission duration of each current expendable payload are supplied. Sizes have been verified in a few cases by making conceptual drawings when sufficient information was available from studies performed for NASA or DoD. In many instances, advances in mission equipment technology are expected in order to meet the mission objectives. When the preliminary design of a satellite was available, it was used in the analyses; however, in most instances, the data for costing and capturing the current satellite concepts were derived without preliminary designs.

Weight estimates are the major data inputs used to determine the current expendable payload cost. To supply weight estimates, the existing data developed in prior studies and programs were used if available and applicable. If these data were not available or applicable, then subsystem weights were estimated using parametric methods.

The parametric method is described in the system analysis section of this volume. The weight estimating procedure emphasized consistent weight

*TT&C and CDPI (communication, data processing and instrumentation) will be interchanged in this report.

estimates that reflect realistic relative weight data rather than absolute weight estimates.

2.1 NASA CURRENT EXPENDABLE PAYLOADS

The basic NASA payload mission data were obtained from the NASA/OSSA responsible engineers and by The Aerospace Corporation. This was accomplished at NASA Headquarters by reviewing each payload as listed in the Von Braun and Fleming (September 1970 and February 1971) models (References 2 and 3) and filling out questionnaires which were designed to assist in obtaining the appropriate facts. In some payload categories, good documentation on mission objectives and equipment requirements were provided, and in other categories there was little available information for the 1978-1990 time period. Contractor data were also used where available. The National Academy of Science (Reference 4) and NASA/OSSA (Reference 5) reports provided additional sources of mission data.

In general, astronomy, space physics, and planetary missions had adequate documentation for use in the study. The information in the life sciences, earth application, communication and navigation, space station, and lunar missions was minimal. Supplemental data on lunar missions were obtained from North American Rockwell Space Division in November 1970; however, the final report on their lunar study was not received in time to be incorporated into this study (Reference 6).

In a few cases, the "Blue Book" (Reference 7) was the reference document, since OSSA indicated that some experiments would fly even if the space station did not exist. These experiments are: (1) Large Stellar Telescope, (2) Large Solar Observatory, (3) High Energy Astronomical Observatory, (4) High Energy Cosmic Ray Laboratory, (5) Physics and Astronomy Airlock Experiment, and (6) Physics and Chemistry Laboratory. These payloads, in general, are in the high payload weight category. In the Fleming "updated NASA Mission Model," the Physics and Astronomy Airlock Experiment and Physics and Chemistry Laboratory were not included in the unmanned payloads but were included as payloads in the Shuttle sortie missions.

All of the available mission data were then reviewed, analyzed, and published in April 1971 in the report, "NASA Payload Data for Integrated Operations/Payloads/Fleet Analysis," (Reference 1). This report provides the system characteristics, the subsystem description, and weight for all of the payloads. For some satellites, the data were based on available data; for others, engineering estimates were used to develop subsystem data because only general mission descriptions were obtained. For example, preliminary engineering data were not provided beyond the scientists' experimental objectives.

With the above mission information, subsystem weight analyses were conducted for the purpose of deriving weight data for the payload. Using this procedure, the total satellite weight differed, as would be expected, from that supplied in Reference 2. In most cases, the differences were not large, and were discussed with the appropriate NASA personnel to arrive at coordinated payload data.

The NASA payload data report (Reference 1) contains data on all of the payloads identified in the earlier Von Braun and updated Fleming models, a total of 99 NASA and non-NASA payloads. No update of this report is anticipated. Any updating will be documented in The Aerospace Corporation computerized Data Bank, which can be updated periodically to incorporate current payload data. Capabilities of this computer program are discussed in Section 5.4, System Analysis. A summary of the payloads used in this study and their characteristics and weight estimates are shown in Table 2-1 through Table 2-7. This information has been reviewed and coordinated with OSSA for use in the Integrated Fleet Analysis. The complete computer listing of payload data is presented in Appendix 4 of this volume.

The "code number" on these tables is listed to assist in locating the payload data in the Data Book and Data Bank. Also, the code number is used by the computer to trace payloads, since the computer is limited to ten letters/digits for the payload title. The "satellite in system" is the number of

payloads in operation for the mission. The "orbit" data are nominal and are for a circular orbit unless noted otherwise. The "life" column provides information on the system (program) operational duration and satellite mean mission duration. The "size" data provide information on the as-launched packaged (shroud) dimensions in cylindrical form. The nested and deployed dimensions in most cases would be smaller and larger, respectively, than the listed dimensions. The mission equipment weight is directly related to the accomplishment of the mission objectives. The launch weight refers to total payload weight assigned to the launch vehicle. This weight includes the adapter weight when launched by an expendable launch vehicle. The launch weight is the satellite weight (payload) when launched by a Shuttle, since the Shuttle includes the holddown and deployment mechanism as part of the launch vehicle, but there is some type of mating adapter on the payload also.

The astronomy, space physics, earth observation, communication and navigation, and planetary missions are all unmanned and are launched by an expendable launch vehicle. The Large Solar Observatory is the exception since it includes the capability of being manned, either by expendable or Shuttle launch vehicles. Tables 2-1 through 2-7 summarize the current expendable payload data for each NASA-supplied payload program grouping. The Sortie Missions (Table 2-5) and Modular Space Station Missions (Table 2-6) are dedicated Shuttle operations. The sortie missions cannot be performed with an expendable launch vehicle. Non-modular space stations, 22 ft in diameter and 33 ft in diameter, can be launched with expendable vehicles. These are not included in the table but are included in the Data Book and Data Bank.

2.2 DOD CURRENT EXPENDABLE PAYLOADS

Data on missions, supporting subsystems, and weight breakdowns have been assembled for approximately 20 different military payloads used in the Integrated Fleet Analysis; they represent Option B of the DoD payload traffic model. These classified data are reported separately in Volume VI of this report. Some of the data were extracted from existing documents, such as

References 8 through 10 and 28, and some from undocumented information from persons familiar with a specific program or persons engaged in defining the mission objectives of a specific satellite. The detailed weight statements were assembled and, in some cases, re-examined for this study and documented in Reference 11.

The DoD payloads range in weight from the Scout-boosted class to the Titan IIID-boosted class, and characteristic velocity requirements range from 26,000 fps to 40,000 fps. Solar cell arrays represent the most common source of electrical power. Mean mission duration requirements for some satellites are long for current technology. State-of-the-art technology advancements are necessary in some cases to realize the proposed system. All of the DoD payloads, as presently configured, are capable of being stowed within the constraints of the proposed 15 ft diameter x 60 ft long Space Shuttle payload bay.

2.3 CHANGES IN PAYLOAD DATA (FROM MID-TERM REPORT)

The mission models for NASA, non-NASA, and DoD were changed following the completion of the Mid-Term Report in January 1971. The NASA changes basically deleted some of the unmanned missions and added manned sortie-type missions. In addition to deletions and additions, the basic NASA mission concept was changed to provide a satellite development-type program. The payloads and schedule were altered to show the progress from R&D to system development, and finally operational status. This approach was incorporated in the Earth Observations and Communications/Navigations groups. New payloads were introduced in the Astronomy and Planetary grouping and others deleted. For use with the Space Shuttle, a modular space station and the sortie missions were introduced. The sortie concept was initiated during this latter study phase, and consequently the payload data were not reviewed and coordinated as thoroughly as the unmanned payload data. The comparison of the September 1970 and February 1971 mission models is summarized on Table 2-8.

The DoD mission model change was made to smooth out the annual funding level required to perform the DoD missions over the 1979 to 1990 time period. The new mission model provides a more uniform traffic schedule and incorporates recent mission planning changes by introducing several new payloads. The comparison between the September 1969 model and the March 1971 model is shown on Table 2-9. (Note: Table 2-9 is a classified table and appears in Volume VI of this report.)

Table 2-1. Summary of NASA Current Expendable Payload Data Astronomy and Physics (OSSA)

Code No.								
Fleming	Data Book	Title	No. of Satel-lites In System	Orbit Alt/Incl n mi/deg	Life Sys/Sat Yr/Yr	Size L/D Ft/Ft	Mission Equip. Weight K Lb	Launch Weight K Lb
15	NAS-1	Large Stellar Telescope	1	350/28.5	10/2	45/13	8.3	22.3
17	NAS-2B	Large Solar Observatory	1	350/30	10/2	57/15	6.9	27.7
19	NAS-3	Large Radio Observatory	1	350/30	10/2	30/14	10.0	20.0
13	NAS-4	High Energy Astronomy Obs.	1	200/30	10/2	50/11	12.3	21.5
10	NAS-7	Solar Orbit Pair A	1	Sync/30	10/5	12/10	0.8	1.9
11	NAS-8	Solar Orbit Pair B	1	1 A.U./28.5	10/5	12/10	0.8	2.5
12	NAS-9	Optical Interferometer A	1	Sync/30	5/5	10/7	0.8	3.1
12	NAS-10	Optical Interferometer B	1	Sync/30	5/5	10/7	0.8	3.1
9	NAS-11	Radio Interferometer	2	2 Sync/28.5	3/3	25/14	3.9	10.4
1	NAS-14A	Astronomy Explorer	1	270/28.5	3/3	4/4.5	0.3	0.9
2	NAS-14B	Astronomy Explorer	1	Sync/0	3/3	4/4.5	0.3	0.9
6	NAS-15	Orbiting Solar Observatory	1	350/28.5	1/1	10/7	0.5	2.0
3	NSP-1	Lower Magnetosphere	1	180x1800*	3/1	8/4	0.1	1.2
4	NSP-2	Middle Magnetosphere	1	1000x20000*	3/1	8/6	0.1	1.0
5	NSP-3	Upper Magnetosphere	1	1 A.U.**	3/1	6/4	0.2	0.6
7	NSP-6	General Relativity	1	300/90	1/1	7/5	0.4	1.5
8	NSP-7	General Relativity	1	1 A.U./28.5	1/1	5/4	0.1	0.5

* Polar inclinations for even years and 28.5° for odd years

** Ecliptic

Table 2-2. Summary of NASA Current Expendable Payload Data Earth Observation (OSSA)

Code No.								
Fleming	Data Book	Title	No. of Satel-lites In System	Orbit Alt/Incl n mi/deg	Life Sys/Sat Yr/Yr	Size L/D Ft/Ft	Mission Equip. Weight K Lb	Launch Weight K Lb
		R&D						
21	NEO-2	Polar Earth Observ.	1	500/100	2/2	15/12	0.9	2.6
22	NEO-3	Sync. Earth Observ.	1	Sync/0	2/2	6/4	0.4	1.0
23	NEO-5	Earth Physics Satellite	1	400/90	2/2	6.5/3.5	0.2	0.6
		SYSTEMS DEMONSTRATION						
27	NEO-4	Sync. Earth Resources	4	Sync/0	2/2	6/4	0.4	1.0
24	NEO-8	Sync. Meterology Satellite	1	Sync/0	2/2	8/5	0.3	1.0
25	NEO-6	Tiros	1	700/100	5/5	10/5	0.2	1.0
26	NEO-17	Polar ERS	4	500/100	2/2	15/12	0.9	2.6

Table 2-3. Summary of NASA Current Expendable Payload Data Communications and Navigation (OSSA)

Code No.		Title	No. of Satel-lites In System	Orbit Alt/Incl n mi/deg	Life Sys/Sat Yr/Yr	Size L/D Ft/Ft	Mission Equip. Weight K Lb	Launch Weight K Lb
Fleming	Data Book							
		<u>R&D</u>						
28	NCN-1	Application Tech. Sat.	1	Sync/0	5/5	21/15	1.6	8.2
30	NCN-2A	Small Applications Technology	1	*/90	1/1	12/6.5	0.2	0.6
29	NCN-2B	Small Applications Technology	1	Sync/0	1/1	12/6.5	0.2	0.6
31	NCN-3A	Cooperative Applications	1	Sync/0	2/2	12/6.5	0.3	0.9
32	NCN-3B	Cooperative Applications	1	*/90	2/2	12/6.5	0.3	0.9
		<u>SYSTEMS DEMONSTRATION</u>						
33	NCN-11	Medical Network Satellite	2	Sync/0	5/5	15/12	0.6	2.1
34	NCN-12	Education Broadcast	2	Sync/0	5/5	25/10	0.3	3.5
35	NCN-13	Follow-on System Demo.	2	Sync/0	5/5	15/12	0.3	2.1
		<u>OPERATIONAL</u>						
36	NCN-5	Tracking and Data Relay	3	Sync/0	12/3	17/10	0.6	2.4

* 3000 x 300 n mi orbit

Table 2-4. Summary of NASA Current Expendable Payload Data Planetary (OSSA)

Code No.		Title	No. of Satel-lites In System	Orbit Alt/Incl n mi/deg	Life Sys/Sat Yr/Yr	Size L/D Ft/Ft	Mission Equip. Weight Lb	Launch Weight K Lb
Fleming	Data Book							
50	NPL-1	Mars Viking	1	Mars	1/1	12/10	2560	7.7
52	NPL-5	Venus Explorer Orbiter	1	Venus	1/1	12/5	50	1.0
53	NPL-6	Venus Radar Mapping	1	Venus	2/2	12/10	320	7.9
54	NPL-7	Venus Explorer Lander - 1	1	Venus	1/1	25/10	600	7.4
54	NPL-8	Venus Explorer Lander - 2	1	Venus	1/1	25/10	1210	4.8
56	NPL-10	Grand Tour	2	Swingby	9/9	12/10	360	1.5
55	NPL-11	Jupiter Pioneer	2	Jupiter	2/2	15/10	50	0.9
57	NPL-13	Jupiter TOPS Orb/Probe	1	Jupiter	3/3	15/10	330	3.3
58	NPL-14	Uranus TOPS Orb/Probe	1	Uranus	7/7	15/10	730	3.7
59	NPL-15	Asteroid Survey	1	Asteroid	4/4	20/10	280	1.9
60	NPL-18	Comet Rendezvous	1	Comet	4/4	20/10	660	2.1
51	NPL-19	Mars Sample Return-A*	1	Mars	3/3	16/14	2380	10.6
51	NPL-20	Mars Sample Return-B*	1	Mars	3/3	23/14	7290	11.4

* Mated in orbit for flight to Mars

Table 2-5. Summary of NASA Current Expendable Payload Data Sortie Mission (OMSF)

Code No.		Title	No. of Satel-lites In System	Orbit Alt/Incl n mi/deg	Life Sys/Sat Yr/Yr	Size L/D Ft/Ft	Mission Equip. Weight K Lb	Launch Weight K Lb
Fleming	Data Book							
38	NSO-1	General Scientific Research	1	200/55	5/.04	54/14*	10.6	27.5
39	NSO-2	General Applications	1	100/65	9/.04	51/14*	13.1	30.0
40	NSO-3	Dedicated Scientific Research	1	200/55	7/.04	54/14*	12.6	29.5
41	NSO-4	Dedicated Applications	1	100/75	7/.04	41/14*	6.2	22.5
42	NSO-5A	Pallet Type - Earth Obs.	1**	125/90	5/.04	37/14*	2.5	6.0
43	NSO-5B	" " Bio Research	1**	200/28.5	5/.04	37/14*	0.8	4.3
44	NSO-5C	" " Astronomy	1**	200/28.5	5/.04	37/14*	2.2	5.7
45	NSO-5D	" " Fluid Met.	1**	200/28.5	5/.04	37/14*	3.6	7.1
46	NSO-5E	" " Teleoperator	1**	200/28.5	5/.04	37/14*	1.5	5.0
47	NSO-5F	" " Man Work Plt.	1**	200/28.5	5/.04	37/14*	3.2	6.7
48	NSO-5G	" " Large Tele. Test	1**	200/28.5	5/.04	51/14*	9.5	13.0
49	NSO-5H	" " Astro. Man Unit	1**	200/28.5	5/.04	37/14*	0.3	3.8

* 14 ft diameter container, 15 ft diameter required for protuberance envelope

** These experiments are performed on a standard pallet and can be performed in combination. The weight assumes each experiment is performed on separate sortie flights.

Table 2-6. Summary of NASA Current Expendable Payload Data Space Station - Modular (OMSF)

Code No.		Title	No. of Satel-lites In System	Orbit Alt/Incl n mi/deg	Life* Sys/Sat Yr/Yr	Size L/D Ft/Ft	Mission Equip. Weight K Lb	Launch Weight K Lb
Fleming	Data Book							
61	NSS-2A	Space Station - Core Module	1	270/55	10/.33	40/14	3.6	20.0
62	NSS-2B	" " Power Module	1	270/55	10/.33	30/14	1.4	20.0
62	NSS-2C	" " Crew Module	2,(4)(1)	270/55	10/.33	30/14	3.6	20.0
62	NSS-2D	" " Control Module	2	270/55	10/.33	30/14	4.3	20.7
62	NSS-2E	" " Gen. Pur. Lab.	1(2)	270/55	10/.33	30/14	8.1	20.7
63	NSS-9	" " Crew/Cargo	2(3)	270/55	10/.33	30/14	7.1	20.0
66	NSS-5A	Exp. Mod. - 1 Life Science	1	270/55	2/.33(2)	58/15	6.9	27.7
67	NSS-5B	Exp. Mod. -1 Earth Observ.	1	270/55	2/.33(2)	58/15	6.9	27.7
69	NSS-5C	Exp. Mod. -1 Space Mfg.	1	270/55	2/.33(2)	58/15	6.9	27.7
64	NSS-7A	Exp. Mod. -2 Phy. Lab.	1	270/55	2/.33(2)	41/15	4.6	24.9
65	NSS-7B	Exp. Mod. -2 Cosmic Ray Lab	1	270/55	2/.33(2)	41/15	4.6	24.9
68	NSS-7C	Exp. Mod. -2 Comm/Nav.	1	270/55	2/.33(2)	41/15	4.6	24.9

* Resupply every four months

(1) Two crew modules and one general purpose lab added in 1985 to raise space station capacity from 6 to 12 men

(2) Refurbish every 2 years, change out experiments each time module returns to earth and is re-orbited (Shuttle)

(3) Build two crew cargo modules and reuse

Table 2-7. Summary of Non-NASA Current Expendable Payload Data

Code No.		Title	No. of Satel-lites In System	Orbit Alt/Incl n mi/deg	Life Sys/Sat Yr/Yr	Size L/D Ft/Ft	Mission Equip. Weight K Lb	Launch Weight K Lb
Fleming	Data Book							
70	NCN-7	Communication Satellite	3	Sync/0	12/5	22/9	0.4	1.5
71	NCN-8	U. S. Domestic Comm.	3	Sync/0	12/7	25/15	1.0	3.5
72	NCN-9	Foreign Domestic Comm.	2	Sync/0	11/5	12/4	0.3	1.0
73	NCN-10A	Nav/Traffic Control	1	Sync/5	12/5	8/5	0.1	0.7
74	NCN-10B	Nav/Traffic Control	4	*/29	12/5	8/5	0.1	0.7
75	NEO-7	TOS Meteorological Satellite	3	700/100	12/4	6/5	0.3	1.0
76	NEO-15	Sync. Meteorological Satellite	2	Sync/0	12/2	8/5	0.3	1.0
77	NEO-16	Polar Earth Resources	4	500/100	12/2	12/6	0.9	2.6
78	NEO-11	Sync. Earth Resources	4	Sync/0	6/3	6/6	0.4	1.0

* 30,000 x 16,000 n mi orbit

Table 2-8. Comparison of NASA Mission Model

		Sept 1970 Model (1978 - 1990)		Feb. 1971 Model (1979 - 1990)	
		Missions (1)	Flights (2)	Missions (1)	Flights (2)
Astronomy & Space Physics	Automated Space Sta. (3) Sortie	20 1 0	163 1 0	17 2 5	91 (4) 2 48
Earth Observation	Automated Space Sta. (3) Sortie	7 0 0	73 0 0	7 1 1	43 2 27
Communications	Automated Space Sta. (3) Sortie	4 0 0	64 0 0	9 1 1	69 2 4
Operational Satellites	Automated	11	192	9	128
Planetary	Automated	16	28	13	19
Life Science	Automated Space Sta. (3) Sortie	2 0 1	20 0 32	0 1 1	0 2 5
Technology	Space Sta. (3) Sortie	0 0	0 0	1 2	1 13
Space Station	Logistic Flts.	1	62	1	65
Total	Automated Space Sta. Sortie	60 2 1	540 63 32	55 7 10	350 74 97
Lunar	Manned	2	419	2	249

NOTE:

(1) Missions are number of programs.

(2) Flights are total number of satellites and do not include resupply, retrieval, or refurbishment flights.

(3) Modules or experiment packages that are docked or integrated with the space station.

(4) LST, HEAO, LSO and LRO are included as automated payloads.

Table 2-9. Comparison of DoD Mission Model

This table is contained in Volume VI, Classified Addendum

NOT AVAILABLE FROM N. T. I. S.

3. PAYLOAD EFFECTS DATA

The data on payload effects, resulting from the influence of the Space Shuttle and new expendable launch vehicles, were obtained from a study conducted by the Lockheed Missiles and Space Company (LMSC). The objectives of the LMSC study were to evaluate low cost design approaches for typical NASA payloads when used with the proposed new launch systems and to estimate development, unit, and operating costs for these payloads. The study was basically performed first by a parametric analysis and then by preliminary design studies on three payloads.

3.1 PARAMETRIC ANALYSIS

The purpose of the LMSC parametric analysis was to determine the minimum payload cost. This was accomplished by developing a mathematical model of the payload cost to obtain optimum payload characteristics (Reference 12). The basic inputs to the payload optimization program (POP) were: baseline payload data; mission data; launch vehicle data; maintenance and refurbishment data; and subsystem cost, weight, and reliability data. The volume and weight were unconstrained. The baseline satellites analyzed were: the Small Research Satellite (SRS), Orbiting Astronomical Observatory (OAO), Synchronous Equatorial Satellite (SEO), and the Mars Orbiter (MO). The mission objectives, orbit, life, mission equipment weight, and total weights are shown in Table 3-1. The satellites are basically payloads that have flown; however, the SEO and MO are modified versions of Boeing's Lunar Orbiter. The modifications were made in order that these two satellites would be more representative of the types of satellites in the NASA mission model.

The results of parametric weight data for low cost versions of these payloads were supplied in Reference 12. Low cost payload data were supplied for the current expendable launch vehicles, the new low cost expendable launch vehicles, and the Space Shuttle vehicle for low and high reliability parts. These weights were compared with the baseline to provide the weight factor for low cost payload designs for use in the mid-term mission model.

The weight factor equation is as follows:

$$\text{weight factor} = \frac{\text{low cost weight}}{\text{baseline weight}}$$

The weight factors were determined for OAO, SEO, SRS, and MO and are tabulated in Reference 13. For each of these payloads except the MO, the optimum mean mission lifetimes were derived from the POP program. The mean mission lifetimes for the OAO were 1/3 year and one year MMD's. The 1/3 year MMD design uses aircraft type components, and the one year MMD uses high reliability parts. In operating the 1/3 year MMD, satellite orbital maintenance is performed twice during the year and, after one year operation, the payload is retrieved and returned to the ground for refurbishment. This ground operation will return the payload to its original mean mission duration (MMD).

The SEO MMD's were 3/4 year and two years where the two-year SEO lifetime is attained by redundancy and high reliability components and is the maximum mean mission duration attainable with current technology for this satellite.

For the MO, only the one-year operation with the Space Shuttle was analyzed. The low cost payload analysis for the current expendable and low cost expendable launch vehicle cases was not performed in the LMSC study.

The payload volume data were provided in Reference 14. The volume increases range from 350 percent to 780 percent, with the average approximately 500 percent.

3.2 PRELIMINARY DESIGN

Preliminary point design was conducted on three payloads for launching by an expendable booster and Space Shuttle. The design was performed to a level necessary to make a credible volume, weight, and cost estimate. This effort was guided by the results of the parametric analysis. Preliminary designs were conducted on the OAO, SEO, and SRS. An outline of the baseline and low cost configuration of each of these payloads is shown on Figures 3-1,

3-2, and 3-3, respectively. The design was conducted to the subsystem level, and in most cases the subsystem was investigated to the component level. Descriptions of these designs are documented in References 15 through 20. The weight data are shown on Table 3-2, 3-3, and 3-4, and the volume data are shown in Table 3-5. The LMSC cost data are reported in Volume III of this report. Also provided from the LMSC design effort were the subsystems' expected lifetimes. This information is necessary to determine the payload MMD when applying the data across the NASA, non-NASA, and DoD payload model. As shown previously, the system life and satellite life of the current expendable payloads have been provided. On Tables 3-6 and 3-7 are listed the low cost subsystems' expected lifetimes for the OAO and SEO.

3.3 OAO LOW COST DESIGN

The low cost OAO design introduced several design features as a result of the Space Shuttle's large available volume, large weight capability, and ability to retrieve payloads for refurbishment. Coupled with these resulting design characteristics was the introduction of technology advances in the mission equipment, guidance and navigation, and CDPI subsystems since the original OAO design was initiated in early 1960.

The most significant technology impact was in the mission equipment, where a currently available high thermal stability material for the optics was used in lieu of the baseline beryllium material. The mirror optics, being in the one meter diameter class, require good dimensional stability for long life space application. To accomplish this, the low cost approach used the large available volume and weight by mounting the telescope section separately from the spacecraft, thereby thermally isolating the telescope rather than mounting it integrally within the spacecraft as in the baseline OAO. For the telescope optics, CERVIT was selected because of its relatively high thermal conductivity and low thermal expansion coefficient. With these characteristics, the use of passive thermal control was determined to be adequate. It should be recognized that CERVIT was only an experimental

development in 1964. The earliest optically finished low expansion glass ceramic blank of appreciable size was a 16-inch diameter mirror for the Kitt Peak Observatory in late 1965. After some improvements to the chemical composition, several large size blanks were produced during 1966; by mid-1967 blanks up to 42 inches in diameter were in stock at Owens Illinois Company (CERVIT) and at Corning Glass Works (ULE). The table below compares the mechanical and thermal properties.

Material	Thermal Conductivity / Thermal Expansion (Watts/cm x 10^4)	Youngs Modulus / Density (cm x 10^8)
Beryllium	12	16.6
Fused Silica	3	3.4
CERVIT	60	3.7

CERVIT clearly shows higher thermal stability characteristics but low stiffness/density relationship. The latter factor would cause the CERVIT to be a heavier mirror optics. It is difficult, within the depth of this study, to determine what gains could be achieved in the baseline OAO-B if CERVIT were available. However, it is clear that glass-ceramic type material can be used to advantage when volume and weight are unconstrained.

With the 1-meter telescope assembled as a separate unit, the satellite was able to incorporate only the housekeeping subsystems into the spacecraft. These subsystems were modularized to facilitate orbital maintenance and ground refurbishment. The size and weights of these modules were limited for handling during orbital maintenance. Internal access to these modules is provided for ground assembly and orbital IVA operations. This feature resulted in a 13-ft outside and 8-ft inside diameter which is more than is needed to sorte the modules. To simplify the structure for cost reduction, an aircraft type semi-monocoque structure is used with more than the required space so that internal access to the modules is possible.

Within the housekeeping equipment a general purpose computer was incorporated to eliminate components in the baseline OAO. The digital computer stored the attitude data continuously and updated the stored attitude data periodically from the gimballed star tracker. The baseline OAO depended upon star trackers and ground calculation for attitude determination and control. Also, the digital computer with its buffer replaced many electronic units in the CDPI, such as data programmer, command decoder, data and command storage unit, data handling equipment, controller unit, etc. This large number of component replacements resulted in a net weight reduction of 32 percent in CDPI from the baseline CDPI. It must be surmised that a computer was considered in the baseline OAO, since the computer could result in lighter weight units, but that it was not incorporated for technical reasons. Since OAO-B was designed, digital computers have matured from normal technology progress. This technical progress probably was not available for the baseline OAO; thus, the CDPI low cost factors were not applied across the mission model.

The G&N was also reduced in weight. This weight reduction was 66 percent. A portion of weight reduction resulted from using the above digital computer to replace components in the G&N. As in the case of the CDPI, the G&N low cost factors were not applied across the mission model.

In the attitude control subsystem, cold gas is used for spacecraft slewing and for unloading the fine pointing momentum wheels. This method replaced the coarse-pointing momentum wheels and magnetic unloading equipment of the baseline design. The cold gas is feasible because the weight is unconstrained for the low cost version. This is an advantage without technology advancement.

The low cost electrical subsystem approach of: (a) using sheet-metal cell substrates, rather than expensive honeycomb structures and (b) relaxation of solar cell procurement specifications to permit acceptance of lower-quality cells that are normally rejected for spacecraft use should result in a lower solar array cost per watt of output at the expense of greater size and weight. The low cost array is fixed when arrays are deployed. These low cost factors were applied whenever the satellite used a fixed array.

The low cost attitude control consists of four independent cold gas units. Each unit is fitted into one module and contains three high level thrusters and three low level thrusters. This low cost factor was applied to those payloads which were large, required slewing, or required two thrust levels. The propellant weight for the attitude control was ratioed in accordance with the percentage change in total weight.

The low cost structure is designed like a conventional airframe. The structural weights supplied by LMSC were modified, in accordance with the cost model which (References 15 through 20) includes the module structure within the structures subsystem. Therefore, the LMSC weights were rearranged by removing the module structure weight from each subsystem and adding it to the structures weight.

The method of applying the structural weight factor is presented in the system analysis section. For the expendable launch vehicle payloads, the portion of the structure used for zero g maintenance capability was removed. This consisted of such items as module base and cover and weighed approximately 513 lb in the OAO.

The weights listed on Tables 3-2, 3-3, and 3-4 include a contingency of 15 percent for all the subsystems except for structures and electrical power which have a contingency of 10 percent and 20 percent, respectively.

The contingency factors are applied because these weights are estimates based on preliminary design.

The LMSC design approach for the expendable payloads was to modify the Shuttle configuration. The modifications were basically in the launch vehicle interface area and the addition of redundancy in the G&N subsystem. Other modifications were incorporated in mission, electrical and CDPI subsystems which are normally required for expendable launch vehicles.

3.4 SEO LOW COST DESIGN

The SEO low cost design was configured to be retrieved by the Space Tug from synchronous orbit and, like OAO, to provide for satellite repair in near earth orbit. A sketch of the baseline and low cost configuration is shown in Figure 3-2. The retrieval is provided by the docking ring on the lower part of the spacecraft and the in-orbit repair and refurbishment is accomplished by external access to the modules. The modules are sized to be less than 30 x 30 x 48 inches and are constructed like "filing drawers" for ease in handling and storage. The modules vary in weight from a maximum of 420 lbs for the photographic experiment module to the lowest weight of 39 lb for the paddle drive electrical module.

The basic structure is a rectangular box with internal dividers which divide the interior into a number of compartments. The box construction is riveted aluminum sheets and extrusions. Attached to the box are the docking ring and solar arrays. The solar arrays are designed to withstand the flight loads in the deployed position. The arrays are not retractable but rotate about one axis for partial sun orientation. The array uses the same OAO low cost concept in that sheet-metal cell substrate and lower procurement specifications are used. The SEO electrical weight growth is higher than OAO because of the orientation mechanism and ruggedized structure weight to sustain flight loads. The electrical weight factor was applied to payloads in the mission model wherever oriented arrays were used.

The environmental control was a multi-layer insulation and thermal coatings on the internal structural surfaces, and uses electrical heaters to maintain the heat balance inthe photographic module. The photographic module required the temperature to be maintained between 33°F to 40°F to assure long life of the Bimat film processing tape.

The G&N subsystem reduced cost by substituting double gimballed momentum wheels for the three reaction wheels, repackaging all electronic assemblies using low-cost techniques, and using off-the-shelf components. These techniques resulted in a weight increase of 1.28 over the baseline. This factor was the same for both the reusable and expendable payloads and was applied to all of the payloads with 3-axis G&N subsystems.

Low cost design was achieved on the attitude control subsystem by using the same independent modules for each of the four quadrants and using available off-the-shelf components. This weight factor was applied to those payloads needing stabilization and in-track translation. The propellants were factored in accordance with the percentage change in total gross weight and mean mission duration.

The CDPI subsystem concept uses basically the same hardware elements as the baseline. The design differences for cost savings were in the equipment design and reliability. Unconstrained weight allowance permitted circuit design which reduced the operating stress level for the same overall performance. The lower stress levels increased the equipment reliability and decreased the required redundancy. The Shuttle also provides payload checkout before deployment and orbit maintenance which leads to additional gains in reliability or reduction in redundancy. The CDPI weight factors are 1.16 and 1.28 for the Shuttle payload and the expendable launch vehicle payload, respectively. These factors include a 15 percent weight contingency. The expendable version is higher in weight primarily because pre-deployment checkout and maintenance are not available.

The baseline design concept of the mission equipment was used in the low cost design; however, the mission requirement placed severe weight limitations on the photographic subsystem. With the volume and weight constraints removed for Shuttle operation, the low cost design was achieved by the use of aluminum in lieu of beryllium, elimination of weight reduction fabrication approaches and use of low density packaging techniques in the electronic assembly. The weight factor is 1.47 and was applied across the mission model for those payloads having similar missions. There is no differentiation between the expendable and Shuttle launch vehicle since the critical reliability item is the Bimat film processing which is independent of the launching vehicle.

3.5 SRS LOW COST DESIGN

The baseline SRS is a low cost space physics experiment and is launched by an Atlas/Agena as a piggyback payload. Payload reusability was not considered for the Space Shuttle operation because of the low unit cost. To achieve low cost concept, the approach was to use the standardized spacecraft method since volume and weight are essentially unconstrained. This was partially achieved by creating a large space for mission equipment, power and propulsion growth. The general outline in comparison with the baseline is shown on Figure 3-3. The low cost SRS has fixed solar panels and has an octagonal cross-section. The spacecraft is a spinner and has solid rockets for insertion into higher energy orbits. The weight factors and cost factors of the SRS were not applied to specific payloads across the mission because, by previous agreement, the data were not available in time for the Integrated Fleet Analysis. The priority for the SRS payload effects data is lower than that for OAO or SEO since the SRS design is not reusable; however, the total weight and package volume was used to supplement the results from the OAO and SEO data. These data are plotted in Figures 4-1, 4-3 and 4-4, which show that SRS further verifies the low cost data trends.

Table 3-1. Summary of LMSC Baseline Payload Data

Payload	Mission Objective	Orbit	Life (Year)	Size L/D (Ft/Ft)	Mission Equip. Weight (Lb)	Total Wt. * (Lb)
Small Research Satellite (SRS)	Basic space research experiment satellite. The experiments are X-ray, aurora, xenon tracking light, radio beacon, ionospheric studies, magnetometer, IR radiation, geophysical research, etc.	300 n mi Circ. 82^{o} Inc.	0.5	1.2/3	56	316
Orbiting Astronomical Observatory (OAO)	Observe variety of stellar targets, and collect and transmit high resolution spectral data in the UV region of spectrum	400 n mi Circ. 35^{o} Inc.	1	17/7.6	967	4811
Synchronous Equatorial Satellite (SEO)	High resolution earth resources imaging, and low resolution TV camera of surface phenomena and meterology.	Sync. Eq.	2^{**}	7/5	294	1163
Mars Orbiter (MO)	Photograph Mars surface, high resolution sensors, and secondary IR and UV measurements.	v_c = 37,400 fps	0.9	9/7	279	941

* Total weight does not include payload interface weight

** Modified to 2 yr for preliminary design

Table 3-2. OAO: Preliminary Design Weight Factors

	Baseline (Lb)	LMSC Weight (Lb)		Weight Mod. (Lb)		Weight Factor	
		Expend.	Shuttle	Expend.	Shuttle	Expend.	Shuttle
Struct. / Mech.	1141	1787	1762	2187*	2675	1.92	2.34
Environ. Control	100	100	100	110	110	1.10	1.10
Guid/Nav & Stab.	716	726	655	410	339	0.57	0.34
Attitude Cont. (Dry)	133	883	883	631	631	4.75	4.75
Propellant	66	320	320	320	320	4.85	4.85
CDPI	456	457	443	324	310	0.71	0.68
Electrical Weight	1232	1859	1775	1775	1671	1.42	1.36
Mission Equip.	967	1985	1970	1877	1862	1.94	1.93
TOTAL DRY	4745	7797	7588	7294	7598	1.54	1.60
TOTAL WET	4811	8117	7908	7614	7918	1.58	1.65

* Portion of module unit weights removed (513 Lb) for expendable payloads

Table 3-3. SEO: Preliminary Design Weight Factors

	Baseline (Lb)	LMSC Weight (Lb)		Weight Mod. (Lb)		Weight Factor	
		Expend.	Shuttle	Expend.	Shuttle	Expend.	Shuttle
Struct. / Mech.	133	722	742	971*	1256	7.30	9.44
Environ. Control	11	73	73	73	73	6.64	6.64
Guid/Nav & Stab.	136	223	223	145	145	1.28	1.28
Attitude Cont. (Dry)	70	573	573	407	407	6.62	6.62
Propellant	60	164	164	164	164	2.73	2.73
CDPI	147	277	254	187	169	1.28	1.16
Electrical Weight	312	664	664	566	566	1.81	1.81
Mission Equip.	294	518	518	431	431	1.47	1.47
TOTAL DRY	1103	3050	3047	2780	3047	2.52	2.76
TOTAL WET	1163	3214	3211	2944	3211	2.53	2.76

* Portion of module unit weights removed (265 Lb) for expendable payloads

Table 3-4. SRS: Preliminary Design Weight Factors

	Baseline (Lb)	*LMSC Weight (Lb)		*Weight Mod. (Lb)		Weight Factor	
		Expend.	Shuttle	Expend.	Shuttle	Expend.	Shuttle
Struct. / Mech.	40	207	207	265	265	5.18	5.18
Environ. Control	6	46	46	46	46	7.66	7.66
Guid/Nav & Stab.	26	64	61	52	50	2.00	1.92
Attitude Cont. (Dry)	14	31	31	31	31	2.21	2.21
Propellant	13	24	24	24	24	1.85	1.85
CDPI	61	78	66	66	54	1.08	0.89
Electrical Weight	100	210	167	199	155	1.99	1.55
Mission Equip.	56	95	95	72	72	1.29	1.29
TOTAL DRY	303	731	673	731	673	2.41	2.22
TOTAL WET	316	755	697	755	697	2.39	2.20

* Values include contingency

Table 3-5. Preliminary Design Volume Ratio

	Baseline		Low Cost		
	Volume (Ft^3)	Package Density (Lb/Ft^3)	Volume (Ft^3)	Package Density (Lb/Ft^3)	Volume Factor (LC/BL)
OAO	770	6	3540	2.24	4.60
SEO	106	10	780	4.11	7.35
SRS	9	35	113	6.17	12.80

Table 3-6. Operating Life Limitations, OAO

Subsystem	Component Limiting Life	Life (Years)
Structure	Structure	10. 0
Environmental Control	Heaters	5. 0
Guidance & Navigation	Star Trackers	1. 0
Attitude Control	Valves	4. 0
CDPI	Computer	1. 5
Electrical	Battery*	3. 0
Mission Equipment	Electronics	1. 5
System	Guidance & Navigation	1. 0

* Solar array life can be extended by providing additional area.

Table 3-7. Operating Life Limitations, SEO

Subsystem	Component Limiting Life	Life (Years)
Structure	Structures	10
Environmental Control	Heaters	5
Guidance & Navigation	Sensors/ Electronics	3
Attitude Control	Valves	4
CDPI	TWTA/ Electronics	2
Electrical	Battery/ Controls	3
Mission Equipment	Bimat/ Vidicon	2
System	CDPI/ Mission Equip.	2

Table 3-8. Low Cost Weight and Volume Factor Comparison for Expendable/Shuttle Launch Vehicles

	Parametric		Design	
	Weight Factor	Volume Factor	Weight Factor	Volume Factor
OAO	1.5/1.8	4.8	1.6/1.7	4.6
SEO	1.9/3.2	3.5	2.5/2.8	7.4
SRS	2.5/2.8	7.8	2.4/2.2	12.8

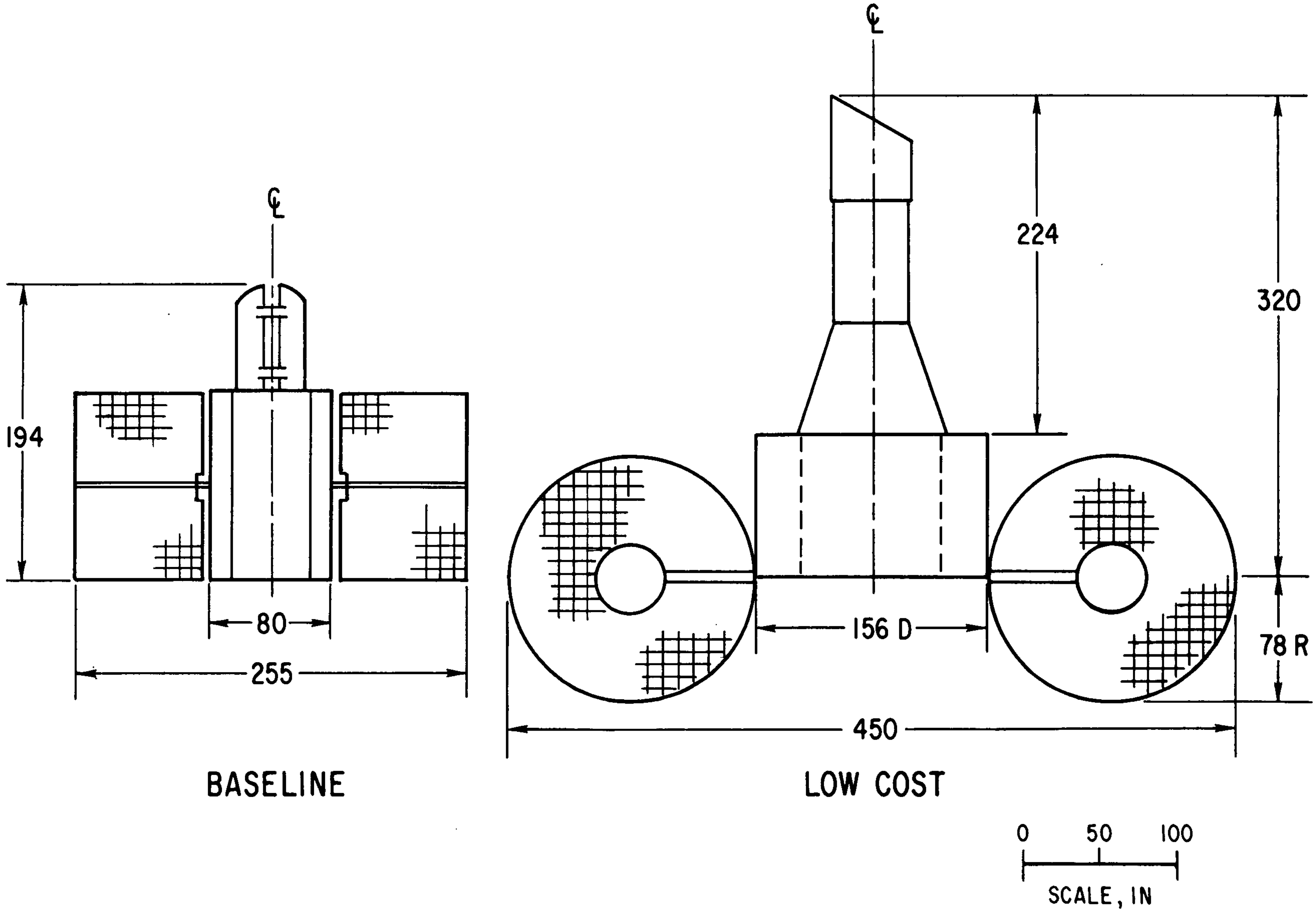

Figure 3-1. OAO-B Configuration

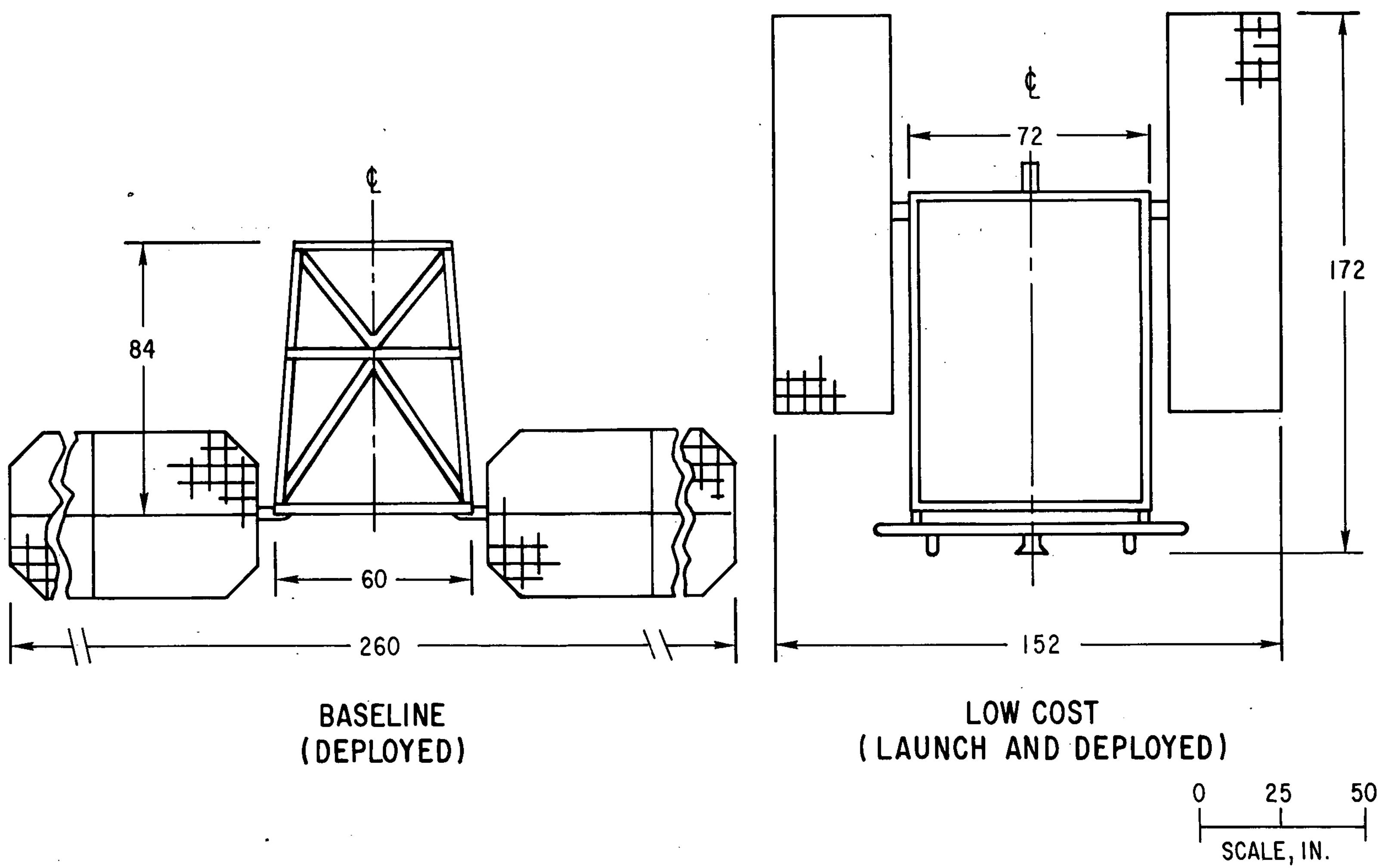

Figure 3-2. SEO Configuration

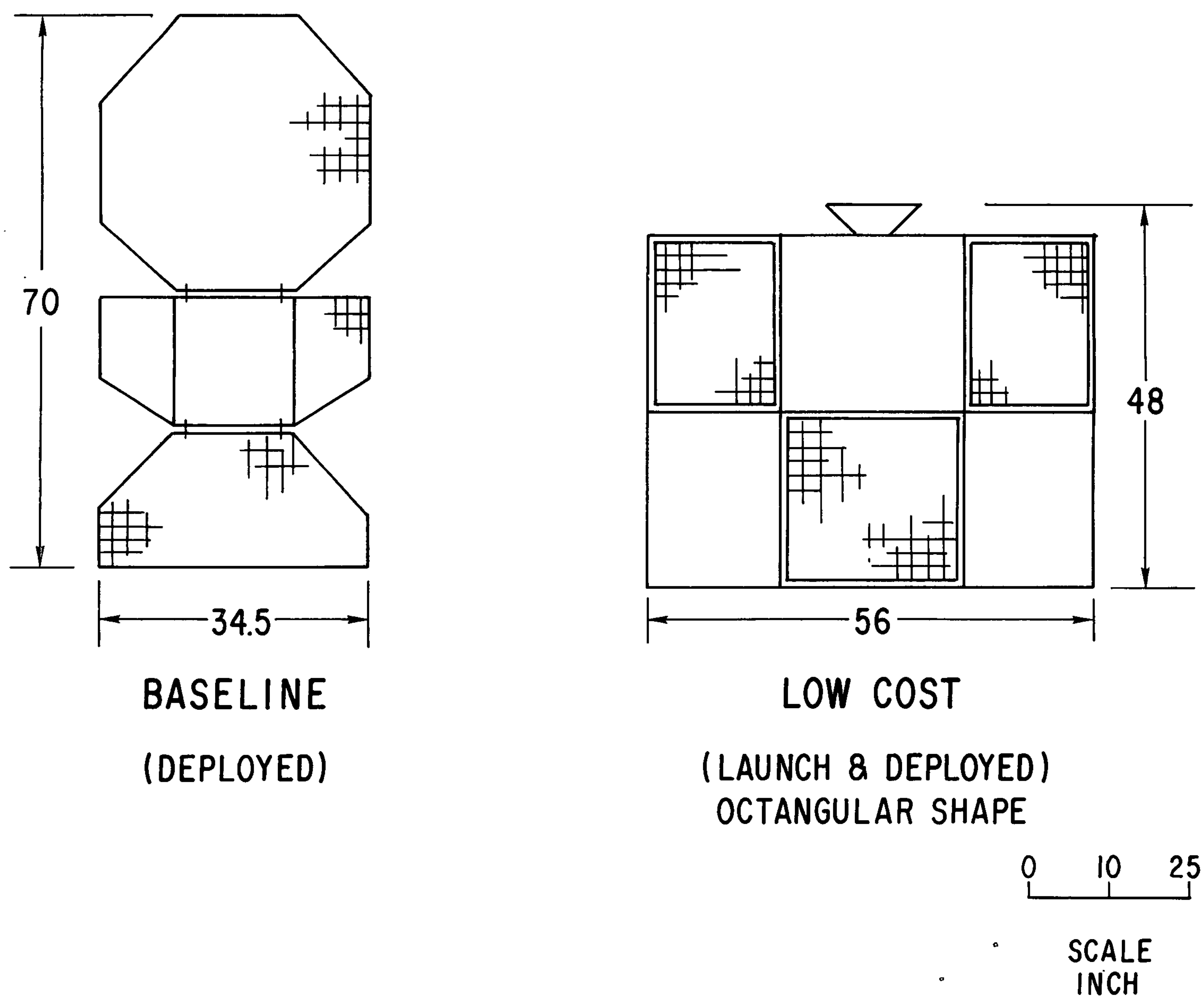

Figure 3-3. SRS Configuration

4. PAYLOAD MODELS

This section describes the method of developing the weight, volume, and life data for (1) current reusable payloads, (2) low cost expendable payloads, and (3) low cost reusable payloads. The current reusable payloads are current expendable payloads adapted for reuse. The low cost payloads are developed by applying the "payload effects" to the unmanned payloads in the NASA, non-NASA, and DoD current expendable payloads. The data on the NASA and non-NASA current expendable payloads are summarized in Section 2, "Current Design, Expendable Payload Descriptions."

The low cost payload data were developed by examining the current expendable payload's mission objective, satellite life, and subsystem characteristics to select the appropriate low cost weight and volume factors at the subsystem level. These low cost factors, which are presented in Tables 3-2, 3-3, 3-4, and 3-5, were not all applied directly. Those factors that are not directly applicable are the structures, environmental control, propulsion, and satellite volume items. These are discussed in the sections below. The other low cost factors, such as guidance and navigation, attitude control, CDPI, electrical and mission equipment, were applied whenever applicable.

4.1 LOW COST PAYLOAD EFFECTS

4.1.1 Structures

The parametric data on structural weight for current expendable satellites have been shown from historical data to be relatable to total satellite weight. This characteristic was examined using the available low cost data and was shown to be valid. The low cost weight data on OAO, SEO, and SRS are plotted in Figure 4-1. Low cost data on heavy payloads are not available; however, it is known that payload volume becomes limited (15 ft dia. x 60 ft long) when the satellite weight exceeds roughly 20,000 lb. This indicates that low cost payload effects diminish as the weight exceeds 20,000 lb. Thus, current weight estimating data for heavy payloads are applicable. This weight

estimating relationship is 20 percent of the satellite weight but, for a conservative estimate, 25 percent was used to account for low cost integration.

With these four data points, a curve for expendable payloads is fitted. The Shuttle structural weight characteristics, having only two data points, are shown to follow the expendable data with the structural weight on the order of approximately one percent of the satellite weight greater at the higher payload weights. This one percent is to account for weights associated with providing zero g maintenance capability. Reusable data for the OAO and SEO were used, but the Shuttle SRS data point was not used because this satellite is not reusable. This weight characteristic has been replotted on Figure 4-2 with the structural weight removed to show the structural weight factor influence at low satellite weight. This figure also permits determination of the structural weight factor without iterative routine.

4.1.2 Environmental Control

The environmental control subsystems of the low cost designed payloads are all passive, except that the SEO is semi-passive. Being passive, the major environmental control weight would be due to insulation and can therefore be related to exposed surface areas. This relationship of surface area to volume can be shown to be as follows for a cube or sphere:

$$\left[\frac{\text{Exposed Area}_{(\text{low cost})}}{\text{Exposed Area}_{(\text{baseline})}}\right] = \left[\frac{\text{Volume}_{(\text{low cost})}}{\text{Volume}_{(\text{baseline})}}\right]^{2/3}$$

This equation and low cost payload data are graphically shown on Figure 4-3. The data points are dispersed about the above equation. The linear relationship was used because of its conservatism and because it provides for a simple approach to determine the environmental control weights.

4.1.3 Propulsion and Propellant

Data on low cost approaches to propulsion subsystem design were not sufficient for application because SRS was the only baseline satellite which

included a propulsion subsystem, a small rocket motor to place the SRS into an elliptical orbit. In the NASA model, only the Astronomy Explorer and the Planetary payload grouping had propulsion subsystems. In the Planetary group, the motors are large, and weight and volume increases are limited because a Space Tug is included in the Space Shuttle cargo bay, constraining the payload to 25 feet in length. The propulsion subsystem was therefore treated with the same structural mass fraction and vacuum velocity as the current expendable payload. The propulsion subsystem weight equation for maintaining the same propulsion characteristic is as follows:

$$\begin{bmatrix}\text{PROPULSION}\\ \text{WEIGHT}\\ \text{FOR}\\ \text{LOW COST}\\ \text{PAYLOAD}\end{bmatrix} = \begin{bmatrix}\text{PROPULSION}\\ \text{WEIGHT}\\ \text{FOR}\\ \text{CURRENT}\\ \text{EXPENDABLE}\end{bmatrix} + 0.15 \begin{bmatrix}\text{PROPELLANT}\\ \text{WEIGHT}\\ \text{INCREASE}\end{bmatrix}$$

$$\begin{bmatrix}\text{PROPELLANT}\\ \text{WEIGHT}\\ \text{FOR}\\ \text{LOW COST}\\ \text{PAYLOAD}\end{bmatrix} = \begin{bmatrix}\text{PROPELLANT}\\ \text{WEIGHT}\\ \text{FOR}\\ \text{BASELINE}\end{bmatrix} \left(\frac{\text{LOW COST PAYLOAD WT}}{\text{BASELINE PAYLOAD WT}}\right) \cdot \left(\frac{\text{MMD LOW COST}}{\text{MMD BASELINE}}\right)$$

The same relationship was used to determine the attitude control propellants.

4.1.4 Volume

The low cost volume listed on Table 3-5 was based on dimensions which can contain the satellite within a cylinder. This method of volume calculation is generally called the "shroud" or "package" volume. Using this volume and the total satellite weight, the packaged density is determined. The package density for all of the unmanned current expendable payloads was determined using this technique and plotted in Figure 4-4 as a function of satellite weight, the data falling within a hyperbola. Superimposed on this figure are the LMSC baseline data points. A curve was fitted using the baseline data points and the heavy payload data points (<20,000 lb) which were obtained from a pre-Phase A type study. To obtain the low cost payload trend, the SRS, SEO, and OAO

low cost data were fitted to follow the same trend as the baseline data. The reusable low cost data, however, are limited to Shuttle volume, as shown on the figure. This approach, when applied to a large number of payloads, should provide an average size and therefore provide consistency in making the volume estimates.

A similar plot (see Figure 4-5) was made for all of the NASA and DoD communication satellites, showing that their densities are lower than for non-communications type satellites. This effect is to be expected since the comsats are generally spin-despun type satellites. These satellites have a low volume usage because of the spinning solar array and the despun antenna unit. Therefore, it was concluded that, in general, the low cost concept would have small influence on the communication satellite sizing. A hyperbolic curve was fitted for this study to provide a consistent basis for volume estimating.

4.2 LOW COST PAYLOAD MODEL

The method of calculating the low cost payload weight and volume is described below and is illustrated on Table 4-6. The illustrated case is the Astronomy Explorer which was selected from the group of low cost payloads listed in Tables 4-1 through 4-5 as a typical payload. The calculating method is as follows:

1. Obtain the current expendable payload data from the Data Book or Data Bank.

2. Select the low cost payload weight factors for Guidance/Navigation, Attitude Control, CDPI, Electrical, and Mission Equipment subsystems from Tables 3-2 or 3-3. The choice depends on the payload characteristics listed in the Data Book or Data Bank. The rationale for the choice is shown in the Remarks column.

3. Estimate the total wet weight factor and volume to determine propellant and environmental control weight.

4. Sum the low cost Shuttle subsystem weight items and enter Figure 4-2 on the Shuttle curve with this sum to obtain reusable satellite structural weight factor.

5. Compute total wet weight and determine total weight factor. If the factor does not agree with the factor used to estimate propellant weight, then iterate until agreement is reached.

6. Enter Figure 4-4 to obtain satellite density following agreement of the total weight factor and compute total satellite volume.

7. Compute total volume factor to assess the estimated volume factor used for environmental control system. Iterate until reasonable agreement is reached. This value is also used for the low cost expendable payload since the spacecraft dimensions are the same except for the absence of the docking ring.

8. Compute the low cost expendable payload in the same manner as above.

9. Compute for the propulsion weight using the relationship shown in Section 4.1.3.

10. Several iterations may be necessary when the propulsion weights are determined.

To perform the above procedure, Table 4-6 was used to organize the calculation. These work tables are included in Appendix 3 for all of the payloads. The results from these calculations have been inputed into the computer and the printouts are in Appendix 4. These tables include only those low cost expendable and low cost reusable payloads that were used by the capture analysis. The space station and sortie mission payloads are not included in the low cost payload grouping because the "payload effects" are not applicable. The sortie missions are not applicable because there is no comparable expendable launch vehicle configuration. Space stations are not applicable because in general the station modules use the full volume and weight capability of the launch vehicles.

The low cost payloads are summarized in Tables 4-1 through 4-4 for NASA and non-NASA missions and in Table 4-5 for DoD missions.

4.3 CURRENT REUSABLE PAYLOADS

The current expendable payloads used in the reusable mode are of particular economic interest because their satellite lifetimes are generally longer than for the low cost payloads. The longer life is achieved by high reliability components and redundancy, as is done currently in satellite design. Since reusability is achieved by orbital retrieval and return to ground for maintenance, it should not significantly influence the basic design of the satellite. It is from this approach that a simplified method has been devised to modify the current expendable payloads to have the capability of refurbishment. To make this method credible, the following assumptions are made:

1. To adapt the satellite for retrieval, velocity and position match for the acquisition and rendezvous are to be determined by the Space Shuttle or ground station.

2. Payloads to be stable and to provide passive support for terminal guidance. (Tumbling or unstable satellites will not be retrieved.)

3. Payloads to provide electrical power and command link for rendezvous equipment and safing/deactivation commands.

4. Automatic rendezvous and docking with manual backup.

5. Standardized docking/deployment interface.

The velocity and position match between the Space Shuttle or Space Tug (chaser) and payload (target) should be achieved within the acquisition range of a laser radar. The laser should have adequate range if a transponder is located in the payload. The laser can also be used for the terminal guidance if several corner reflectors are located on the payload to provide data on the payload attitude in addition to range and range rate.

A TV camera located on the chaser will provide backup data and assistance in the form of payload inspection and gross rendezvous operation.

The docking would use the same mechanism as that used in the payload deployment. This docking ring should be approximately six feet in diameter, which appears to be the nominal diameter in the space station studies. After docking is achieved, the payload should be deactivated and safed by commands from the Shuttle or Tug. The equipment involved in the command deactivation should be the same hardware as that used in the initial payload activation. Also, retraction of appendages such as the antenna and solar arrays may be required for the return flight or for storage in the cargo bay.

To summarize, the equipments involved for deployment and retrieval are as follows:

	Space Shuttle	Space Tug	Payload
1.	Laser	Laser	Transponder and Corner Reflector
2.	Docking Mechanism	Docking Mechanism	Adapter and Docking Mechanism
3.	CDPI	CDPI	CDPI
4.	TV Display	TV Camera	-
5.	Computer	-	-

Items 2, 3, and 5 are normal equipments used to deploy the payloads, and Items 1 through 5 are needed for payload retrieval. It is reasonable to assume that the Space Shuttle will have included Items 1 through 5, since these types of equipments will be required to deploy and retrieve the Space Tug. The Space Tug, however, is not expected to be as universally used due to marginal performance capability when used for round-trip missions. The retrieval-peculiar equipment for the Tug is the TV camera. The payload add-on kit is the transponder and corner reflectors.

The weights of the items used for retrieval and refurbishment are as follows:

	Space Tug (lb)	Payload (lb)
Laser Transponder	0	25
Corner Reflector	0	5
TV Camera	25	0
Docking Mechanism	0	2% (wt) + 30
Refurbishability	0	10% (wt)
Retraction of Appendages	0	3% (wt)
Total	25	15% (wt) + 60

where (wt) is the total expendable payload weight. The weights for the docking mechanism, retraction mechanism, and design modifications to permit refurbishment are assigned to the structures subsystem. The weight allocation for refurbishability is considered to be those modifications necessary to the structure for accessibility and subsystem modularity. The laser transponder and corner reflector are grouped under the G&N subsystem. These weight allocations are used to determine the current reusable payload cost.

The method of estimating the volume was based on accommodating the docking mechanism. It was assumed that a 6-ft diameter docking ring would be the standard size and that one foot should be added to the payload length to adapt the mechanism. Thus, the diameter of the current reusable payloads is six feet minimum and one-half ft larger than the current expendable if the diameter is equal to or greater than six feet.

Using the above relationship, the computer was used to determine the weight and volume for the current reusable payloads. The listing of the current reusable payloads is given in Appendix 4, and is summarized on Tables 4-1 through 4-5.

The MMD's for these current reusable payloads are assumed to be the same as for the current expendable payloads except for those payloads which have relatively short lives. For those with short MMD's, the payload was divided into mission equipment and spacecraft, the mission equipment MMD being the same as for the current expendable payloads, and the spacecraft portion having longer life. The MMD extensions for the spacecraft were established during the capture analysis and are listed on Tables 4-1 through 4-5. No additional weight allocations have been made to extend the spacecraft MMD; however, appropriate cost factors have been applied in the cost analysis. This modification to the division of MMD has not been inputed to the Data Bank.

In the planetary mission group, Table 4-4, the current reusable and low cost reusable payloads are not shown, because these payloads are considered expendable for the Space Shuttle. The expendable payload data are applicable for the Space Shuttle, except that an adapter will not be required. This would reduce the launch weight by approximately 4 percent.

Table 4-1. Summary of NASA Unmanned Payloads Astronomy and Space Physics

NASA NO.	CODE NO.	TITLE	CURRENT EXPENDABLE MMD (YR)	CURRENT EXPENDABLE SIZE L/D (FT/FT)	CURRENT EXPENDABLE LAUNCH WT K (LB)	CURRENT REUSABLE MMD Yr/Yr*	CURRENT REUSABLE SIZE L/D (FT/FT)	CURRENT REUSABLE LAUNCH WT K (LB)	LOW COST EXPENDABLE MMD (YR)	LOW COST EXPENDABLE SIZE L/D (FT/FT)	LOW COST EXPENDABLE LAUNCH WT K (LB)	LOW COST REUSABLE MMD (YR)	LOW COST REUSABLE SIZE L/D (FT/FT)	LOW COST REUSABLE LAUNCH WT K (LB)
15	NAS-1	LARGE STELLAR TELESCOPE	2	45/13	22.3	2	46/13	21.1	2	45/13	22.3**	2	46/13	21.1**
17	NAS-2B	LARGE SOLAR OBSERVATORY	2	57/15	27.7	2	58/15	25.5	2	57/15	27.7 **	2	58/15	25.5**
19	NAS-3	LARGE RADIO OBSERVATORY	2	30/14	20.0	2	31/14	19.0	2	30/14	20.0**	2	31/14	19.0**
13	NAS-4	HIGH ENERGY ASTRONOMY OBS	2	50/11	21.5	2	51/11	20.4	2	50/11	21.5**	2	51/11	20.4**
10	NAS-7	SOLAR ORBIT PAIR — A	5	12/10	1.9	5	13/10.5	2.2	2	12/10	3.4	2	/10	3.6
11	NAS-8	SOLAR ORBIT PAIR — B	5	12/10	2.5	5	13/10.5	2.9	2	17/11	5.1	2	18/11	5.3
12	NAS-9	OPTICAL INTERFEROMETER — A	5	10/7	3.1	5	11/7.5	3.5	2	21/15	8.2	2	22/15	8.5
12	NAS-10	OPTICAL INTERFEROMETER — B	5	10/7	3.1	5	11/7.5	3.5	2	21/15	8.2	2	22/15	8.5
9	NAS-11	RADIO INTERFEROMETER	3	25/14	10.4	3	26/14.5	11.6	1.5	63.5/15	20.6	—	—	—
1	NAS-14A	ASTRONOMY EXPLORER	3	4/4.5	0.9	3/6	5/6	1.1	1.5	8/7	1.7	1.5	9/7	1.8
2	NAS-14B	ASTRONOMY EXPLORER	3	4/4.5	0.9	3/6	5/6	1.1	1.5	8/7	1.7	1.5	9/7	1.8
6	NAS-15	ORBITING SOLAR OBSER.	1	10/7	2.0	1	11/7.5	2.3	1	15.5/10	4.3	1	16.5/10	4.5
3	NSP-1	LOWER MAGNETO SPHERE	1	8/4	1.2	1/5	9/6	1.4	1	12/12	4.1	1	13/12	4.7
4	NSP-2	MIDDLE MAGNETO SPHERE	1	8/6	1.0	1/5	9/6.5	1.2	1	8.5/9	2.4	1	9.5/9	2.7
5	NSP-3	UPPER MAGNETO SPHERE	1	6/4	0.6	1/5	7/6	0.7	1	7.5/6	1.2	1	8.5/6	1.3
7	NSP-6	GENERAL RELATIVITY	1	7/5	1.5	1/4	8/6	1.7	1	11/10	3.6	1	12/10	3.7
8	NSP-7	GENERAL RELATIVITY	1	5/4	0.5	1	6/6	0.6	1	8/6	1.1	1	9/6	1.4

* Mission Equipment MMD/Spacecraft MMD

** These Payloads are not "Low Cost" Payloads; They are Listed for Completeness Only.

Table 4-2. Summary of NASA Unmanned Payloads Earth Observations

NASA NO.	CODE NO.	TITLE	CURRENT EXPENDABLE			CURRENT REUSABLE			LOW COST EXPENDABLE			LOW COST REUSABLE		
			MMD (YR)	SIZE L/D (FT/FT)	LAUNCH WT K (LB)	MMD Yr/Yr*	SIZE L/D (FT/FT)	LAUNCH WT K (LB)	MMD (YR)	SIZE L/D (FT/FT)	LAUNCH WT K (LB)	MMD (YR)	SIZE L/D (FT/FT)	LAUNCH WT K (LB)
21	NEO-2	POLAR EARTH OBSER. SATELLITE	2	15/12	2.6	2/6	16/12.5	2.9	2	15.5/13	5.7	2	16.5/13	6.0
22	NEO-3	SYNCHRONOUS EARTH OBSER.	2	6/4	1.0	2/6	7/6	1.2	2	9.5/9	2.7	2	10.5/9	2.8
27	NEO-4	SYNCHRONOUS EARTH RESOURCES	2	6/4	1.0	2/4	7/6	1.2	2	9.5/9	2.7	2	10.5/9	2.9
23	NEO-5	EARTH PHYSICS SATELLITE	2	6.5/3.5	0.6	2/6	7.5/6	0.7	2	8/7	1.6	2	9/7	1.7
25	NEO-6	TIROS	5	10/5	1.0	5	11/6	1.2	2	8/8	2.0	2	9/8	2.1
75	NEO-7	TOS METEOROLOGICAL**	4	6/5	1.0	4	7/6	1.2	2	8.5/8	2.2	2	9.5/8	2.3
24	NEO-8	SYNC METEOROLOGICAL	2	8/5	1.0	2	9/6	1.2	2	9.5/9	2.7	2	10.5/9	2.9
78	NEO-11	SYNC. EARTH RESOURCE**	3	6/6	1.0	3	7/6.5	1.2	2	10/8	2.4	2	11/8	2.6
76	NEO-15	SYNC. METEOROLOGICAL**	2	8/5	1.0	2/4	9/6	1.2	2	9.5/9	2.7	2	10.5/9	2.9
77	NEO-16	POLAR EARTH RESOURCE**	2	12/6	2.6	2/4	13/6.5	2.9	2	15/14	6.0	2	16/14	6.4
26	NEO-17	POLAR ERS	2	15/12	2.6	2	16/12.5	2.9	2	13/14	5.7	2	14/14	6.0

* Mission Equipment MMD/Spacecraft MMD

** Non-NASA Payloads (Satellites)

Table 4-3. Summary of NASA Unmanned Payloads Communication and Navigation

NASA NO.	CODE NO.	TITLE	CURRENT EXPENDABLE MMD (YR)	CURRENT EXPENDABLE SIZE L/D (FT/FT)	CURRENT EXPENDABLE LAUNCH WT K (LB)	CURRENT REUSABLE MMD Yr/Yr*	CURRENT REUSABLE SIZE L/D (FT/FT)	CURRENT REUSABLE LAUNCH WT K (LB)	LOW COST EXPENDABLE MMD (YR)	LOW COST EXPENDABLE SIZE L/D (FT/FT)	LOW COST EXPENDABLE LAUNCH WT K (LB)	LOW COST REUSABLE MMD (YR)	LOW COST REUSABLE SIZE L/D (FT/FT)	LOW COST REUSABLE LAUNCH WT K (LB)
28	NCN-1	APPLICATION TECH. SATELLITE	5	21/15	8.2	5	22/15	9.2	2	47/15	15.1	2	48/15	15.2
30	NCN-2A	SMALL APPLICATION TECH.	1	12/6.5	0.6	1/5	13/7	0.8	1	12/6.5	1.2	1	13/6.5	1.3
29	NCN-2B	SMALL APPLICATION TECH.	1	12/6.5	0.6	1/5	13/7	0.8	1	12/6.5	1.2	1	13/6.5	1.3
31	NCN-3A	COOPERATIVE APPLICATIONS	2	12/6.5	0.9	2/4	13/7	1.0	2	12/6.5	1.9	2	13/6.5	2.0
32	NCN-3B	COOPERATIVE APPLICATIONS	2	12/6.5	0.9	2/4	13/7	1.0	2	12/6.5	1.9	2	13/6.5	2.0
36	NCN-5	TRACKING AND DATA RELAY	3	17/10	2.4	3/4	18/10.5	2.7	3	22.5/15	4.7	3	23.5/15	5.0
70	NCN-7	COMMUNICATION SATELLITE**	5	22/9	1.5	5	23/9.5	1.7	2	20/10	2.6	2	21/10	2.8
71	NCN-8	U.S. DOMESTIC COMMUNICATION**	7	25/15	3.5	7	26/15	4.0	2	26.5/15	5.4	2	27.5/15	5.6
72	NCN-9	FOREIGN DOMESTIC**	5	12/4	1.0	5	13/6	1.2	2	13/10	2.1	2	14/10	2.2
74	NCN-10A	NAV/TRAFFIC CONTROL**	5	8/5	0.7	5	9/6	0.9	2	8.5/6.5	1.5	2	9.5/6.5	1.6
73	NCN-10B	NAV/TRAFFIC CONTROL**	5	8/5	0.7	5	9/6	0.9	2	8.5/6.5	1.5	2	9.5/6.5	1.6
33	NCN-11	MEDICAL NETWORK SATELLITE	5	15/12	2.1	5	16/12.5	2.4	2	16.5/14	3.6	2	17.5/14	3.7
34	NCN-12	EDUCATION BROADCAST	5	25/10	3.5	5	25/11	4.0	2	32/15	6.2	2	33/15	6.4
35	NCN-13	FOLLOW-ON SYSTEM DEMO	5	15/12	2.1	5	16/12.5	2.4	2	16.5/14	3.5	2	17.5/14	3.7

* Mission Equipment MMD/Spacecraft MMD

** Non-NASA Payloads (Satellite)

Table 4-4. Summary of NASA Unmanned Payloads Planetary

NASA NO.	CODE NO.	TITLE	CURRENT EXPENDABLE			LOW COST EXPENDABLE		
			MMD (YR)	SIZE L/D (FT/FT)	LAUNCH WT K (LB)	MMD (YR)	SIZE L/D (FT/FT)	LAUNCH WT K (LB)
50	NPL-1	MARS VIKING	1	12/10	7.7	1	29/15	10.4
52	NPL-5	VENUS EXPLORER ORBITER	1	12/5	1.0	1	12.5/7	2.4
53	NPL-6	VENUS RADAR MAPPING	2	12/10	7.9	2	60/15	20.3
54	NPL-7	VENUS EXPLORER LANDER - 1	1	25/10	7.4	1	29.5/15	10.8
54	NPL-8	VENUS EXPLORER LANDER - 2	1	25/10	4.8	1	21/12	6.4
56	NPL-10	GRAND TOUR	9	12/10	1.5	NA	NA	NA
55	NPL-11	JUPITER PIONEER	2	15/10	0.9	2	15/10	2.3
57	NPL-13	JUPITER TOP ORB/PROBE	3	15/10	3.3	NA	NA	NA
58	NPL-14	URANUS TOPS ORB/PROBE	7	15/10	3.7			
59	NPL-15	ASTEROID SURVEY	4	20/10	1.9			
60	NPL-18	COMET RENDEZVOUS	4	20/10	2.1			
51	NPL-19	MARS SAMPLE RETURN - A*	3	16/14	10.6			
51	NPL-20	MARS SAMPLE RETURN - B*	3	23/14	11.4			

* These Payloads are Launched Separately and Docked in Orbit for Flight to Mars

NA = Not Applicable (Because of Size or MMD)

Table 4-5. Summary of DoD Payloads, Option B

This table is contained in Volume VI, Classified Addendum

C.2.

Table 4-6. Low Cost Payload Characteristics

Astronomy Explorer, NAS 14 (A) & (B)

Date: 11 May 1971

Name	Current Expendable	Expendable Factor	Shuttle Factor	Low Cost Expendable	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	3/3			3/1.5	3/1.5	Life Reduced for CDPI and Mission Equipment	
Launch Volume, Ft^3	63		~5.2	308	346	Use Satellite Density	
Launch Length, Ft	4			8	9		
Launch Diameter, Ft	4.5			7	7		
Structure/Mechanism Weight, Lb	200	0.525	0.695	525	675	Structure Factor Applies to all Subsystems Except Propulsion (See Fig. 4.2 for Str. Wt.)	SEO
Environmental Control Weight, Lb	15	~6	~6	90	90	Volume Ratio - Passive	OAO
Guidance/Navigation and Stabilization Weight, Lb	40	1.28	1.28	51	51	3-Axis	SEO
Dry Propulsion Weight, Lb	30	See Remarks		30	30	$W_P = W'_P + 0.15 (\Delta W_{Prop.})$	BL
Propellant Weight, Lb	80	See Remarks		73	82	Maintain Vacuum Velocity and Reduce to MMD	BL
Dry Attitude Control Weight, Lb	14	6.62	6.62	93	93	Needs Similar to SEO	SEO
Propellant Weight, Lb	20	~1.9	~2.1	19	21	Ratio by Total Weight and MMD	SEO
TT&C Weight, Lb	50	1.28	1.16	64	58		SEO
Electrical Weight, Lb	161	1.81	1.81	292	292	Oriented Array	SEO
Mission Equipment Weight, Lb	250	1.47	1.47	368	368	Similar to SEO - But Each Flight Different Exp.	SEO
Total Dry Weight, Lb	760			1513	1657		
Total Wet Weight, Lb	860	1.87	2.05	1605	1760		
Adapter Weight, Lb	30			55	0		
Launch Weight, Lb	890			1660	1760		

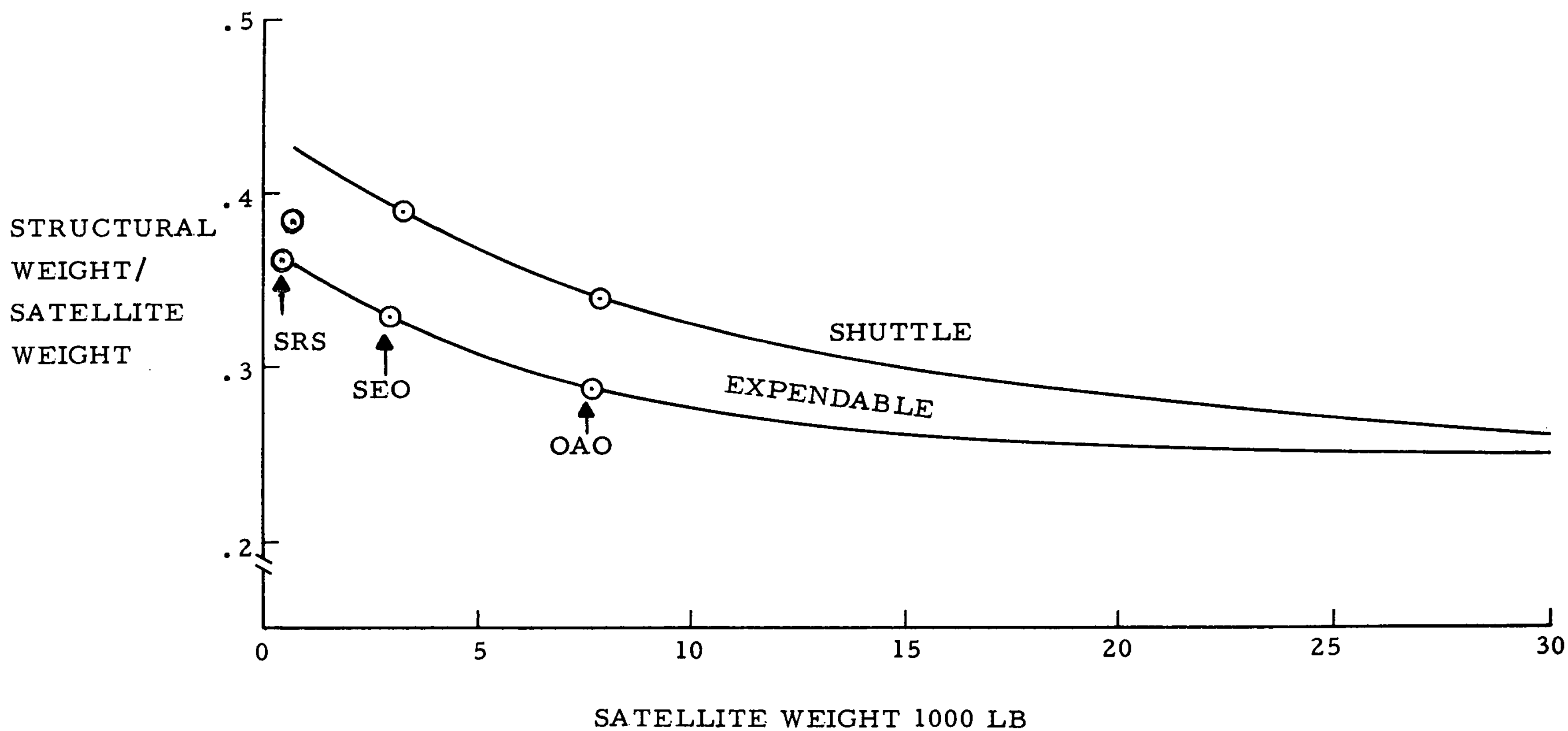

Figure 4-1. Structural Weight Factor

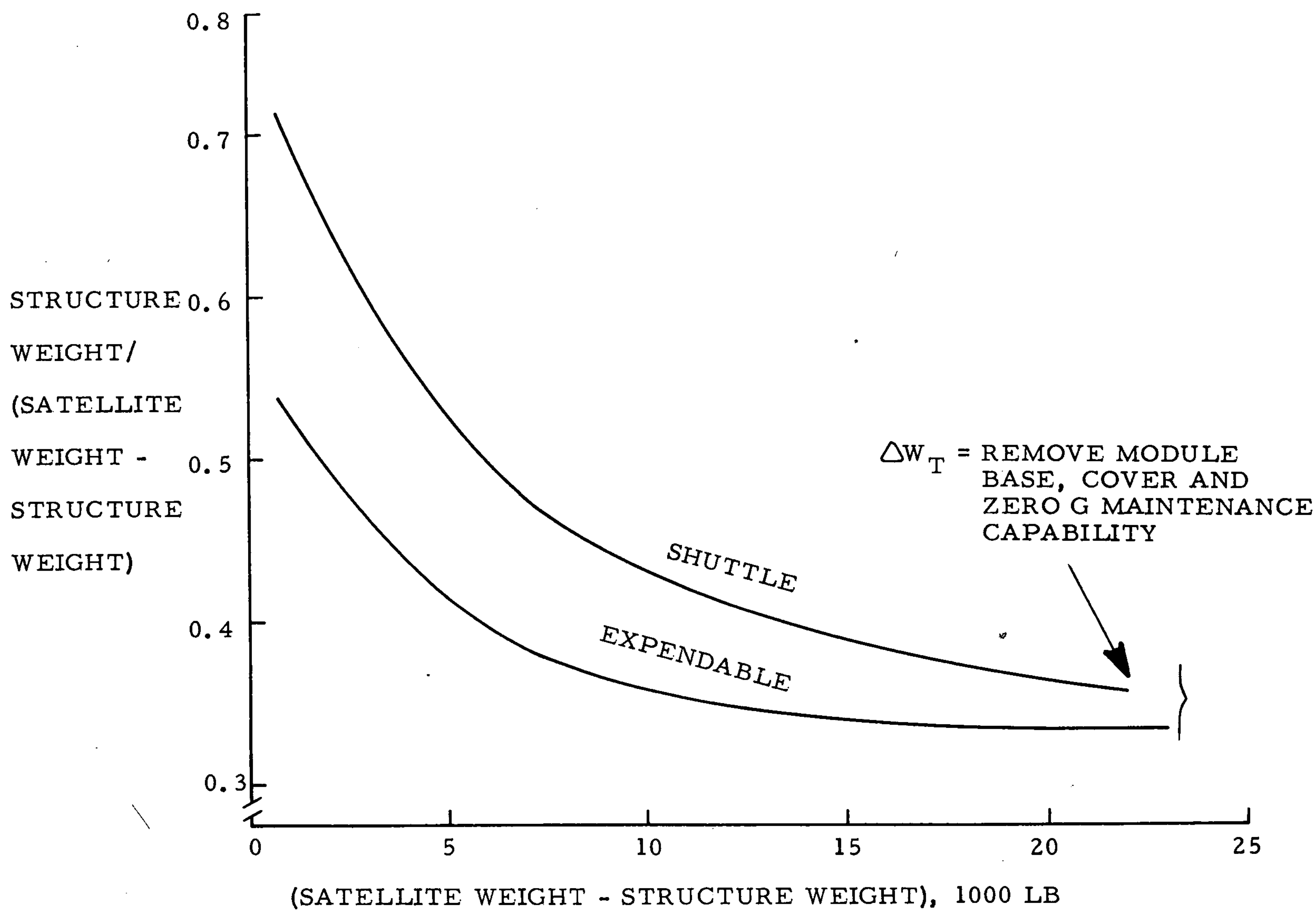

Figure 4-2. Structural Weight Factor

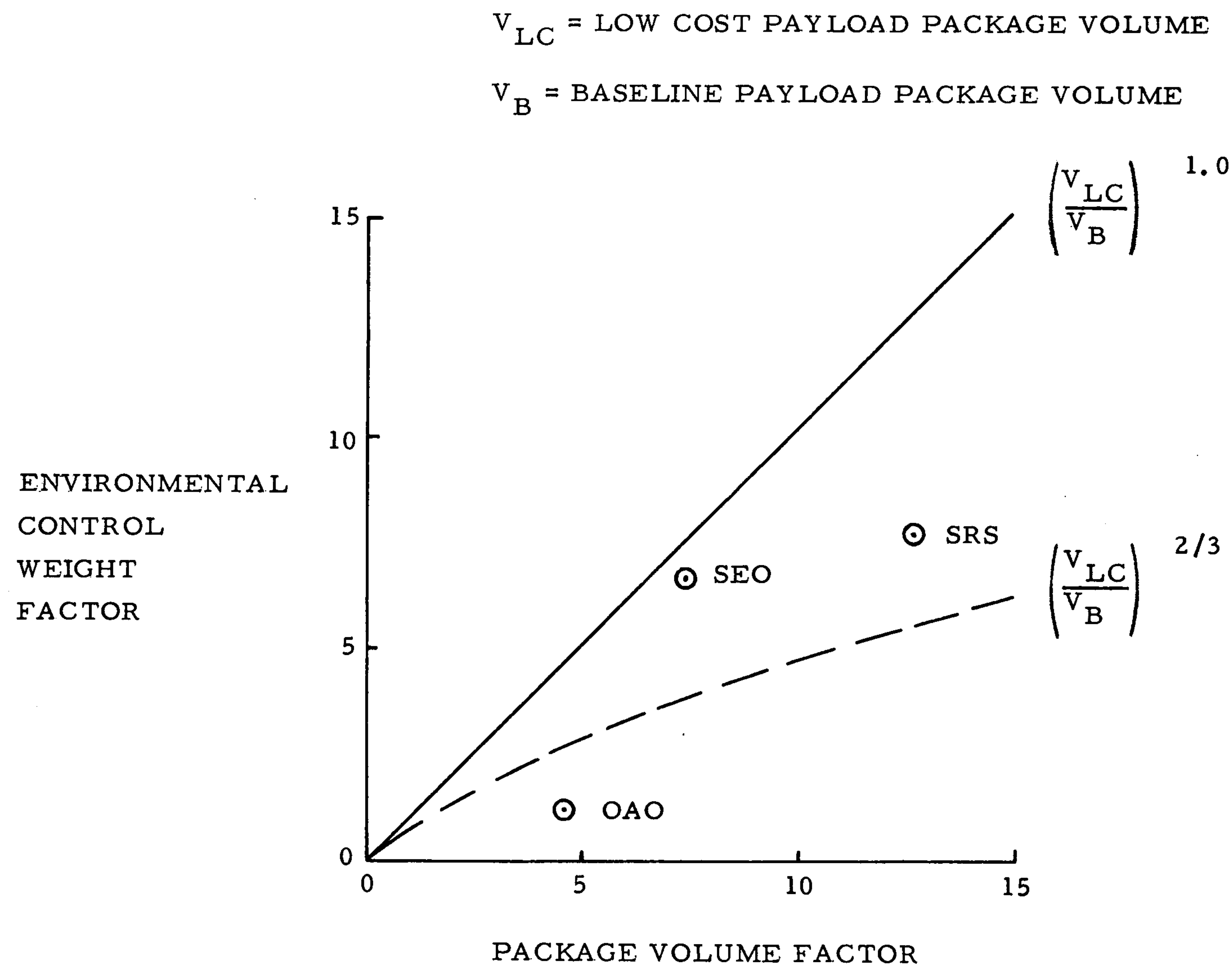

Figure 4-3. Environmental Control Weight Factor

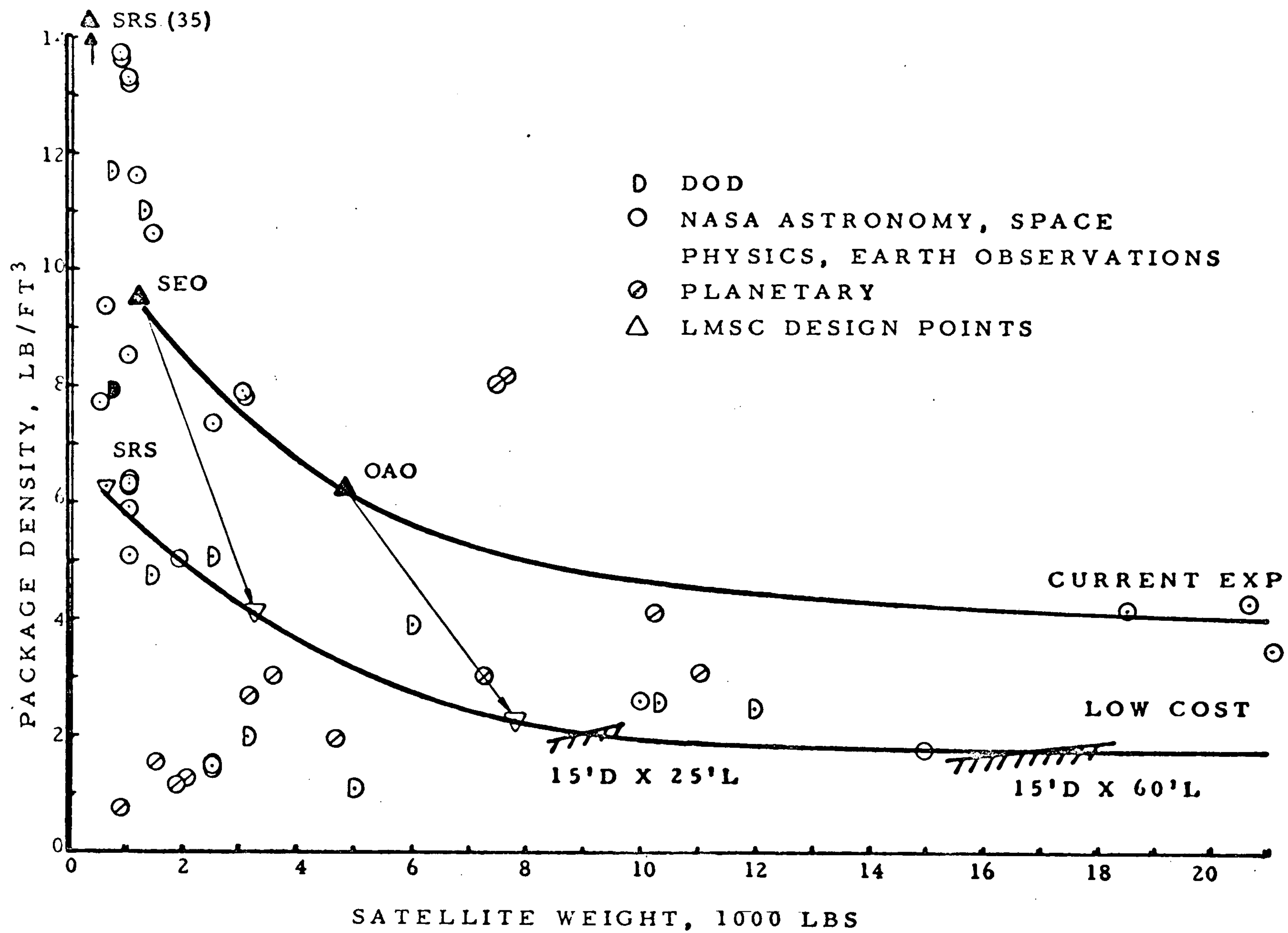

Figure 4-4. Satellite Densities

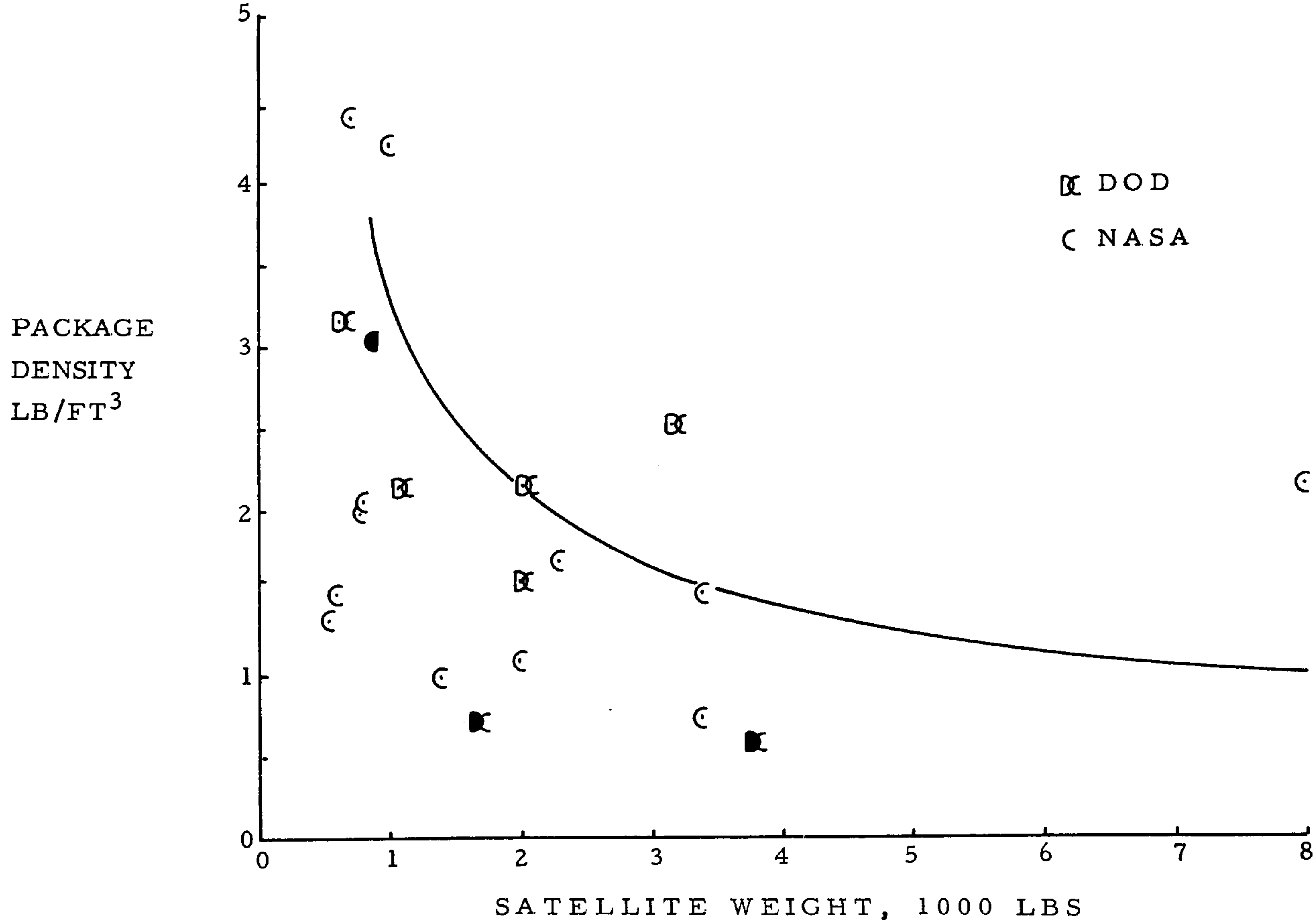

Figure 4-5. Communication Satellite Densities

5. SYSTEM ANALYSIS

Various analyses were conducted during this study to assist in formulating and in evaluating payload data. Some of these analyses were reported in the mid-term report (Reference 13) and are not reported in the final report. Subjects reported in the mid-term report are the Large Stellar Telescope, Subsystem Cost Reduction Potential, Reliability, Cost Reductions with Refurbishment, and Payload Data Bank. The Payload Data Bank, however, will be discussed again to complete the description on the computer program. The analyses reported in this section are either additional analyses or analyses that were conducted earlier but not previously reported. These subjects are Payload Weight Analysis, Structural Analysis, and The Influence of Mean Mission Duration on Program Cost.

5.1 WEIGHT ANALYSIS

The large number of current expendable payloads and the scarcity of available design information for payloads in the 1979-1990 era combined to restrict the satellite weight estimating methods to parametric approaches (Reference 21). In many cases, the available payload data were limited to the mission objectives, gross payload weight, and orbit parameters. In other cases, design information on mission-peculiar equipment and power requirements were supplied or pre-phase A type study data were available on several satellite programs.

In all estimates, current technology was assumed in the current expendable payload data and technology advancement was not considered. This assumption then permitted the use of parametric weight equations which are based on empirical data. Furthermore, past experience has shown that this approach provides the most reliable prediction when design data are not available.

Each of these weight estimating procedures is described below in the order of use for generating the current expendable payload weight, i.e., 1) Phase A type data, 2) subsystem parametric data, and 3) gross parametric data. It should be recognized that subsystem weights are

the basic input data to determine the current expenditure payload cost, and to determine the current reusable and low cost payload weight data. The payload weights are also used in the capture analysis. The weight statements for each of the current expendable payloads are documented in Reference 1 for NASA and non-NASA satellites and in Reference 11 for DoD satellites.

5.1.1 Phase A Type Weight Data

For several payloads, pre-phase A payload data or spacecraft design study information was used. When these data were applicable to specific missions, either directly or by scaling techniques, they were used in preference to weight data estimated from the other methods. The pre-phase A type study and other spacecraft design that were available are referenced in NASA Payload Data Book (Reference 1). As an example, the OAO/LST (Reference 22) provided data for the large stellar telescope payload and also provided information on other similar large experiment projects such as the Large Solar Observatory and Large Radio Observatory. The HEAO and Mars Sample Return payloads (Reference 23) have also undergone a pre-phase A type study. Similarly, the space station and some of the planetary missions are currently in the phase A studies. The Mars Viking and Grand Tour data were obtained from JPL directly. The Blue Book (Reference 7) provided data primarily on the mission equipments, and secondarily data on the experiment module.

5.1.2 Subsystem Parametric Weight Estimate

The subsystem which used available payload information was the electrical subsystem. This was possible because in many cases the mission peculiar equipment power requirement was specified. This information plus the orbit parameters given in the mission model, judgement as to the type of solar array (oriented or unoriented), and the estimate of satellite housekeeping power requirements provided data on total power needs. With the total power requirements, the electrical power subsystem weights can then be estimated by entering Figure 5-1.

The electrical subsystem weight is given as a function of orbit altitude, and oriented and unoriented solar arrays. Power subsystem weight for a radioisotope thermoelectric generator using P - 238 isotope fuel is shown in Figure 5-2.

Similar weight relationships for other subsystems were developed as shown on Figure 5-3. However, to use these types of weight relationships requires additional subsystem data that were not available. For these cases gross parametric subsystem weight data were used.

These gross parametric subsystem weight data were reviewed by the appropriate subsystem specialist and were considered best data when subsystem design studies are not performed or available. This method also provides consistency with the cost estimating relationship which is similarly based on past program data.

The electrical subsystem was generally treated in the manner described in the first paragraph of this section because power needs were usually specified. In a few instances, power needs were abnormally high or low. For these cases, the power-weight relationship provided the more realistic subsystem weights.

5.1.3 Gross Parametric Weight Estimate

Parametric weight equations were generated from subsystem weight data for 18 existing automated satellites weighing from 200 to 20,000 lbs at launch. Plots of subsystem weights as a function of satellite gross weights were then made and a best fit was estimated. The equations for these best fit trends are given in Table 5-1. These best fit curves were established by inspection as shown on Figure 5-4, which illustrates the correlation of the electrical power subsystem weight as a function of satellite gross weight. All of the satellites represented on this plot use solar array-battery systems and include power conditioning and power distribution. Although major design parameters such as total power requirements, design life, orbit parameters, system configuration have not been stated, a reasonable relationship exists between the electrical power subsystem and satellite gross weight. The electrical subsystem weight

characteristic is typical of the other subsystems although the correlations of subsystem weights and gross weights were not as good in most cases. However, a definite trend of subsystem weight and satellite gross weight was observable in all cases.

5.2 STRUCTURAL SIZING ANALYSIS

A preliminary structural sizing study (Reference 24) was performed to determine the effect of launch vehicle load factors and structural safety factors on satellite structural weight. The satellite used for this investigation was the LMSC low cost version of the OAO. The launch vehicles considered were those in the current expendable and low cost expendable fleet, and the Space Shuttle. These launch vehicles and the corresponding limit load factors are listed on Table 5-2. These load factors were assumed to act simultaneously and include dynamic factors. These loading conditions occur at critical times during the flight profile and in general are the designing conditions for the major portion of the primary structure. For a comparison of loading conditions, Table 5-3 shows the steady state load factors for a representative Space Shuttle. The selected condition can be seen as the highest loading condition except for the emergency landing condition. The emergency landing condition uses appropriate design factors to prevent structural damage to the crew compartment by the payload. The payload may fail but shall not cause damage to the crew compartment.

A satellite design for this analysis, the OAO low cost design (Reference 15), was selected as the model to represent the geometrical envelope and subsystem weight and location. The structural model and loading in the Space Shuttle are depicted in Figure 5-5. The loading represents a 1.0 g axial and lateral loading and includes all of the subsystem weights except for the structure, attitude control propellant and the solar array paddle weights. The latter two component weights are not included because they are supported near the interface base. For convenience, the loads are depicted as concentrated on the centerline. The loading for the analysis assumed a uniformly distributed load around the circumference.

The range of ultimate load factors considered was 1.25 to 3.0. The 1.25 ultimate load factor is a commonly used value for current expendable launch vehicles. A 1.40 factor is currently used for the Space Shuttle design studies, while a 3.0 factor is used for LMSC for the "Payload Effects Study" (Reference 15). These factors are applied to the limit load factors shown on Table 5-2 to obtain the ultimate loading conditions.

5.2.1 Method

The exact sizing procedure is iterative, determining initial structural thicknesses based only on loads due to equipment and instrumentation and then determining increased structural thicknesses due to the increased loading caused by the inertia loading of the structural elements. Since this study was a preliminary sizing effort with emphasis on the differences between launch vehicles and since the loading, due to structural components, is small relative to the other loading, the iteration procedure was not used. However, to initially account for the loading due to structural weight, the low cost payload structural weight estimate (1762 lbs) was applied as a uniform surface loading (lb/in^2) to the OAO configuration (Reference 15). The thicknesses of each of the OAO structural components, i.e., forward cylinder, intermediate cone, and aft cylinder, were determined by shell stability considerations. The applied design load was taken as the maximum equivalent axial load on the component. It was assumed that each of the components had a constant wall thickness.

The satellite structural weight corresponding to a specific launch vehicle and safety factor was determined from the previously computed component thicknesses. These values represent theoretical weights and must be multiplied by an appropriate "non-optimum" factor to correspond to actual manufactured components. Since the objectives of this study were to determine the effect of launch vehicle environment and safety factor on the satellite structural weight, each of the structural weights was divided by the low cost payload structural weight (1762 lb) to obtain the normalized structural weight factor. In this manner, the non-dimensionalized results indicate the desired effects parametrically without the necessity of determining appropriate non-optimum factors.

5.2.2 Results

The results of this method are on the upper three curves of Figure 5-6 as a function of safety factor and launch vehicle relative to the same design launched on the Space Shuttle with a safety factor of 1.40. It is seen that the relative weights correspond to the launch vehicle accelerations (although, not in a directly proportional manner) with the highest weight indicated for the Atlas Centaur ($\eta_z = \pm 9.6g$) and the lowest for the Space Shuttle ($\eta_z = \pm 4.5g$). Similarly, it is seen that the structural weight is not directly proportional to safety factor, but increases at less than the square root of the safety factor. For example, a change in safety factor from 1.40 to 3.0 increases the structural weight of an OAO-class satellite launched on the Space Shuttle by a factor of 1.35.

It is also shown that Space Shuttle launched OAO-class payload can be designed to a much higher safety factor for the same equivalent weight on the other launch vehicles; conversely the Shuttle launched payload can be designed lighter for the same safety factor. For example, an OAO-class satellite launched on an Atlas Centaur with safety factor of 1.25 could be designed to a safety factor of 1.92 for Space Shuttle launch with no increase in weight.

5.2.3 Discussion

Reviewing the launch vehicle load factors on Table 5-2, it is noted that all the accelerations are specified as acting in either direction. Since the primary axial component would be the booster acceleration, the positive axial values are representative of expected values; however, the negative axial values, based upon dynamic effects, may be conservative. In the case of conventional boosters, i.e., the current or low cost expendables, the positive axial accelerations (i.e., aft), in conjunction with lateral accelerations, would dictate the design of an OAO-class structure as defined in this study. This results since the design stress levels are compression and the sizing is based on structural stability considerations. However, in the case of the Space Shuttle, the choice of a very conservative negative

acceleration (i.e., forward) eliminates an important design parameter for optimizing satellite structural weight. This parameter is the distinction between a satellite mounted at the forward end of the payload bay versus one mounted at the aft region. These conditions are depicted on Figure 5-5.

The aft mounted case is similar to the satellite condition in a conventional booster. However, the forward mounted case is unique, since the satellite is "pulled" into space. This case results in tensile forces on the satellite structure for positive axial accelerations. If the negative axial acceleration is not of the same magnitude as the positive value, a lighter satellite structure would result for the forward mounted case.

The forward acceleration ($\eta_{axial} = 0$) is assumed to be zero, as a lower bound contrast to the previous study results. This condition is shown on the bottom curve of Figure 5-6. Additionally, this condition is used as the basis for Figure 5-7 where all boost vehicles are compared relative to the weight of a forward mounted OAO-class satellite under the assumption that forward acceleration is zero and the Space Shuttle safety factor is 1.40. Figure 5-7 indicates that quite dramatic weight reductions would be possible for a forward mounted Space Shuttle payload if the negative axial accelerations could be minimized by tailoring payload/Shuttle interface flexibilities and dynamic transients such as engine shutdowns. Lower weights should reduce the structural cost accordingly.

5.3 INFLUENCE OF MMD ON PROGRAM COST

The payload data that were developed for the "Integrated Fleet Analysis" are based on current technology. Technology advancement for the 1979-1990 era was not factored into the payload data that were used in the capture and cost analysis. This study ground rule was consistent with the LMSC "Payload Effects Study" which supplied the data to develop low cost payload characteristics. Since past history has demonstrated improvements in satellite reliability and life, it is of interest to determine the cost sensitivity from technology progress in reducing failure rates. Figure 5-8

shows the progress of reliability over the past five years at the Hughes Aircraft Corporation . The data shown on this figure were obtained from flight hardware. The failure rate trend appears to be reaching Minuteman-II (MM-II) reliability asympototically. The Minuteman parts are considered the ultimate in reliability since they are manufactured on a special production line where the processing and assembly have been optimized to increase part reliability. Each part receives the 100 percent burn-in, screening, and inspection to eliminate early failure, unstable devices, and production variability.

With parts reliability apparently approaching the minimum failure rates, the redundance method appears to be the most promising remaining method to increase MMD. This subject of MMD versus redundancy has been discussed, analyzed and presented on most of the satellite programs and is, therefore, assumed in this study to be an input to the analysis. The MMD is defined on Figure 5-9 as the truncated area under the reliability curve and was varied from one to six years.

5.3.1 Method

The program cost was determined for the expendable and reusable modes assuming that the RDT&E and operations costs were the same between the two operating modes. This assumption therefore compares only the total unit program cost and is considered conservative, since the LMSC "Payload Effects Study" has indicated that the RDT&E and operations costs are slightly lower for the Space Shuttle payloads. With this simplification, the total unit cost equation is as follows:

$$\text{Cost} = \begin{bmatrix}\text{Cost to establish}\\ \text{the System}\end{bmatrix} + \begin{bmatrix}\text{Cost to maintain}\\ \text{the System}\end{bmatrix}$$

For expendable launch vehicles, the above generalized cost equation is:

$$C\ (\text{expendable}) = \frac{S}{R_{BE}} \left[C\ (EL) + C\ (ES)\right] + E_E(t) \left[C(EL) + C(ES)\right]$$

where:

S =	Number of satellites in system
R_{BE} =	Expendable launch vehicle reliability
$C(EL)$ =	Expendable launch vehicle cost
$C(ES)$ =	Expendable payload cost
$E_E(t)$ =	Expected number of expendable launches to maintain system

For the Space Shuttle, the total unit cost equation is:

$$C(\text{Shuttle}) = \frac{S}{R_{BS}} \left[C(SL)\right] + \left(S + (SP)\right) \left[C(RS)\right] + E_S(t) \left[C(SL) + C(RS)R\right]$$

where:

R_{BS} =	Space Shuttle reliability
$C(SL)$ =	Space Shuttle launch cost
$C(RS)$ =	Reusable payload cost
R =	Percent refurbishment cost
(SP) =	Number of spares
$E_S(t)$ =	Expected number of refurbishment flights

The payload costs in both cases above were parameterized by varying the satellite unit cost per pound and assuming a constant payload weight of 2,200 lb.

The expected number of launches, $E(t)$ is developed in Reference 26.

$$E(t) = \left[\frac{T_C}{MMD} \quad (N-G) - (T-NT_C) \; \frac{1-R_C^{\;N+1}}{MMD} \quad + G+1 \right] \frac{S}{R_B}$$

where

$G =$	$R_C \; \dfrac{1 - R_C^N}{1 - R_C}$
$N =$	INT (T/T_C)*
$S =$	Number of satellites in system
$T =$	System program duration
$T_C =$	Truncation time
$R_C =$	Reliability at truncation time
$R_B =$	Launch vehicle reliability
$MMD =$	Mean mission duration

A typical operational satellite program that is being planned for mid-1970 operation was selected to establish the above terms.

$S =$	4 (satellites in system)
$T =$	10 year (program duration)
$R_C =$	0.30 (reliability at truncation time)
$R_B =$	0.95 (reliability for T-IIIC) = R_{BE}
$R_B =$	0.995 (reliability for Space Shuttle) = R_{BS}
$C(EL) =$	\$13.2M (T-IIIC)
$C(SL) =$	\$5.1M (Space Shuttle & Space Tug)
$R =$	10% and 40% (refurbishment cost)
$SP =$	2 (reusable payload spares)

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*INTEGER Values only: decimal fractions are truncated

The assumed reliability function is as follows:

$$R(t) = e^{-\left(\frac{1 - R_C}{MMD} t\right)}$$

which is a function of MMD and reliability at truncation time (T_C). With R_C specified above, the truncation time as a function of MMD can be determined.

5.3.2 Results

The expected number of launches based on the above system model is shown on Figure 5-10 for 100 percent availability. One hundred percent availability is achieved by instantaneously launching a replacement payload after a satellite has failed. The expected number, as shown, is representative for either launch vehicle, since the difference in reliability between T-IIIC and the Space Shuttle is small. It can be observed from the resulting expected launches that the reduction in launches beyond three years MMD is relatively small.

Cost relationships were determined for various satellite unit costs per pound and as a MMD function. The results are plotted on Figure 5-11 for a refurbishment cost at 40 percent of the unit cost. It can be observed that the cost using the Space Shuttle is lower than the expendable launch vehicle when comparing the same MMDs at a given satellite unit cost per pound. To observe the trend of total program unit cost as a function of MMD, Figure 5-12 was plotted for a payload cost of $10,000 per pound and for a refurbishment cost of 10 percent and 40 percent of the unit cost. The $10,000 per pound unit cost was selected because it is a nominal cost per pound for satellite this size in synchronous orbit.

The Shuttle cost is clearly shown to be lower than the expendable launch cost for the same satellite unit cost. It also appears that the refurbishment cost is a large cost reduction driver. The 10 percent refurbishment cost results in a 20 percent total unit cost reduction over the 40 percent refurbishment cost for a five year MMD.

Using the preceding analytical approach, with satellite reuse, the cost reduction beyond a three year MMD is relatively insensitive to increasing MMD. This indicates that any further decrease in parts failure or increase in redundancy rate will not have a large influence on satellite program cost using the Space Shuttle. It is possible that if cost as a function of MMD is included, an optimum MMD may exist since cost is a function of MMD.

5.4 DATA BANK

For this study, it was found that a rapid method of documenting, cataloging, printing and retrieving payload data was required. This was necessary since the mission model and payload data would undergo periodic updating or revisions. These changes must then be documented and made available for use in the study. To make changes and print the Data Book (Reference 1), the process was found to be slow and time consuming. As a result of this experience, emphasis was placed on developing a computer program to document, catalogue, print and retrieve payload data. This program is referred to as the Data Retrieval System (DARES).

To use the DARES computer program, the user describes the individual characteristics of a payload and provides the numerical information for each characteristic. The numerical information is referred to as the payload data base. The payload data base for each satellite could be described by ninety (up to 1000 is available in the computer) characteristics, such as, launch weight, electrical power, volume, launch schedules, etc. Thus, each satellite would need ninety numerical entries to provide a complete description. A data bank of 100 satellites would require 9,000 entries.

Once the payload data base has been set up, the user can perform retrievals of information. In this mode, specific satellite data can be qualified for printout. The computer is used to perform the interrogations of the Data Bank, making as many different passes as the user requires.

The structure of the computer program is divided into six major modules as shown on Figure 5-13 and is shown to depict the intended total system.

The program is still in the development stage and some of the indicated capabilities have not been implemented yet or completely defined, namely, the Save and Update modules. However, the program was developed to a sufficient degree to perform the Data Bank task. For instance, the Update task was done manually by rearranging the card deck. Details of the Data Retrieval System are described in Appendix 1 and Reference 27.

Table 5-1. Weight Estimating Equations

Subsystem	Equation
Structure and Mechanisms (solar array substrate excluded)	
Cylinders (body mounted solar array)	$0.2W$
Non-cylinders (paddle mounted solar array)	$0.15W$
Thermal Control	$0.025W$
Guidance, Navigation, Stabilization	$0.008W^{1.3}$
Attitude Control Propellant	$0.48W^{0.743}$
Attitude Control - Dry	$0.472W^{0.663}$
Telemetry, Tracking, Command, Data Processing	$0.9W^{0.673}$
Electrical (including solar array substrate)	$0.25W$
Mission Peculiar	$0.23W$
Launch Vehicle Adapter	$0.035W$
	W = Spacecraft Launch Weight, Pounds

Table 5-2. Launch Vehicle Load (g's)

Launch Vehicle / Load Direction	Atlas/Centaur	T-III/L2	Space Shuttle
Axial	± 9.6	± 6.0	± 4.5
Pitch	± 3.0	± 3.0	± 3.0
Yaw	± 3.0	± 3.0	± 2.0

NOTE: 1) Loads Include Dynamic Factor

2) Loads are Limit Load Condition

Table 5-3. Space Shuttle Steady State Load Factor (Reference 25)

Load Direction / Load Condition	Axial	Yaw	Pitch
Launch	+1.5	±0.5	-0.5
High Dynamic Pressure	+1.9	±1.0	±1.0
End Booster Thrust	+3.0	±0.6	-0.6
End Orbiter Thrust	+3.0	±0.5	-0.5
Entry	+0.25	±0.5	-2.0
Flyback	+0.25	±0.5	+1.0 -2.5
Landing	+0.8 -1.0	±0.5	-2.5
Emergency Landing	-10.0	+1.5	-5.0

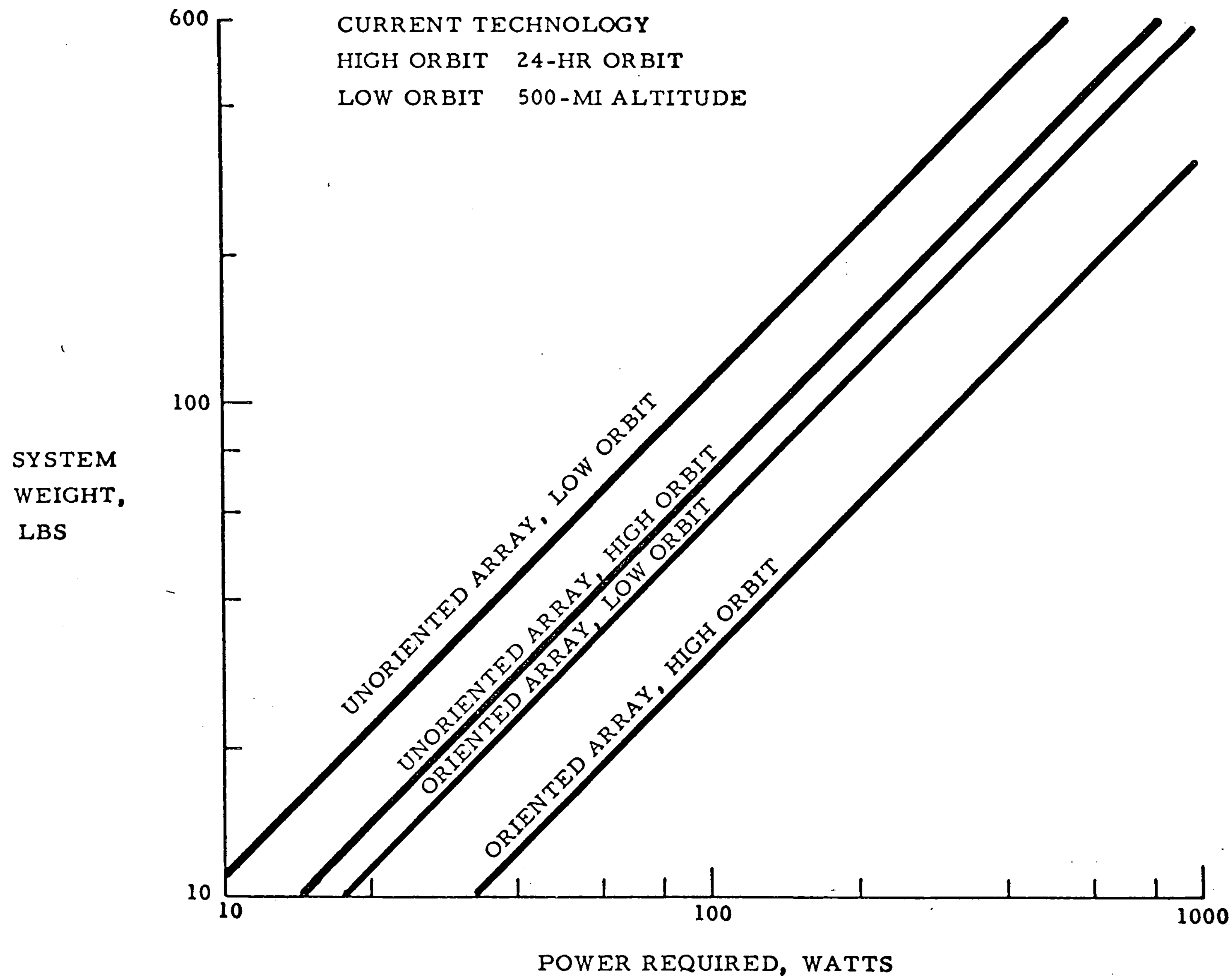


Figure 5-1. Weight of Solar Array-Battery Power Systems

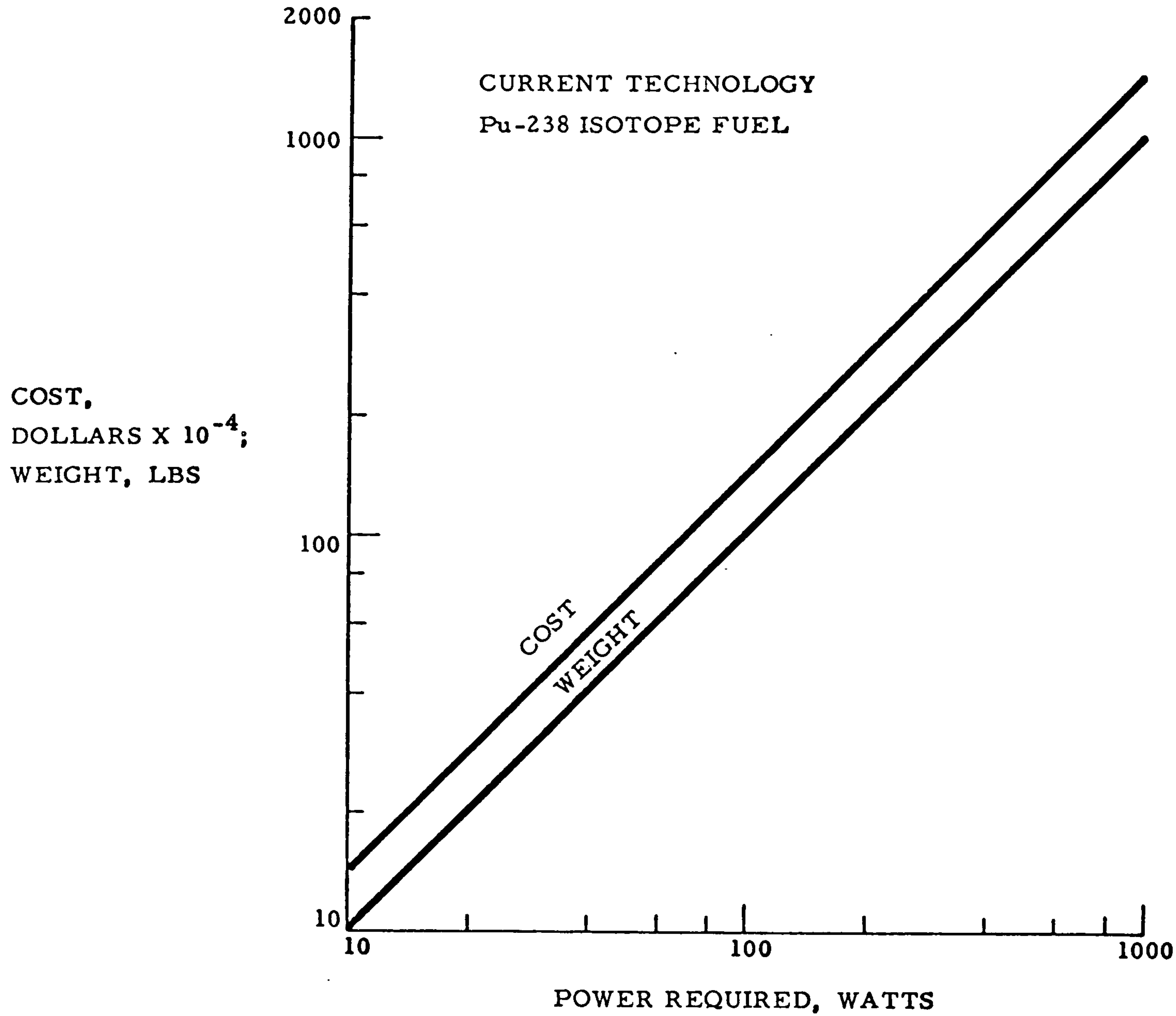


Figure 5-2. Cost and Weight of Radioisotope Thermoelectric Power Systems

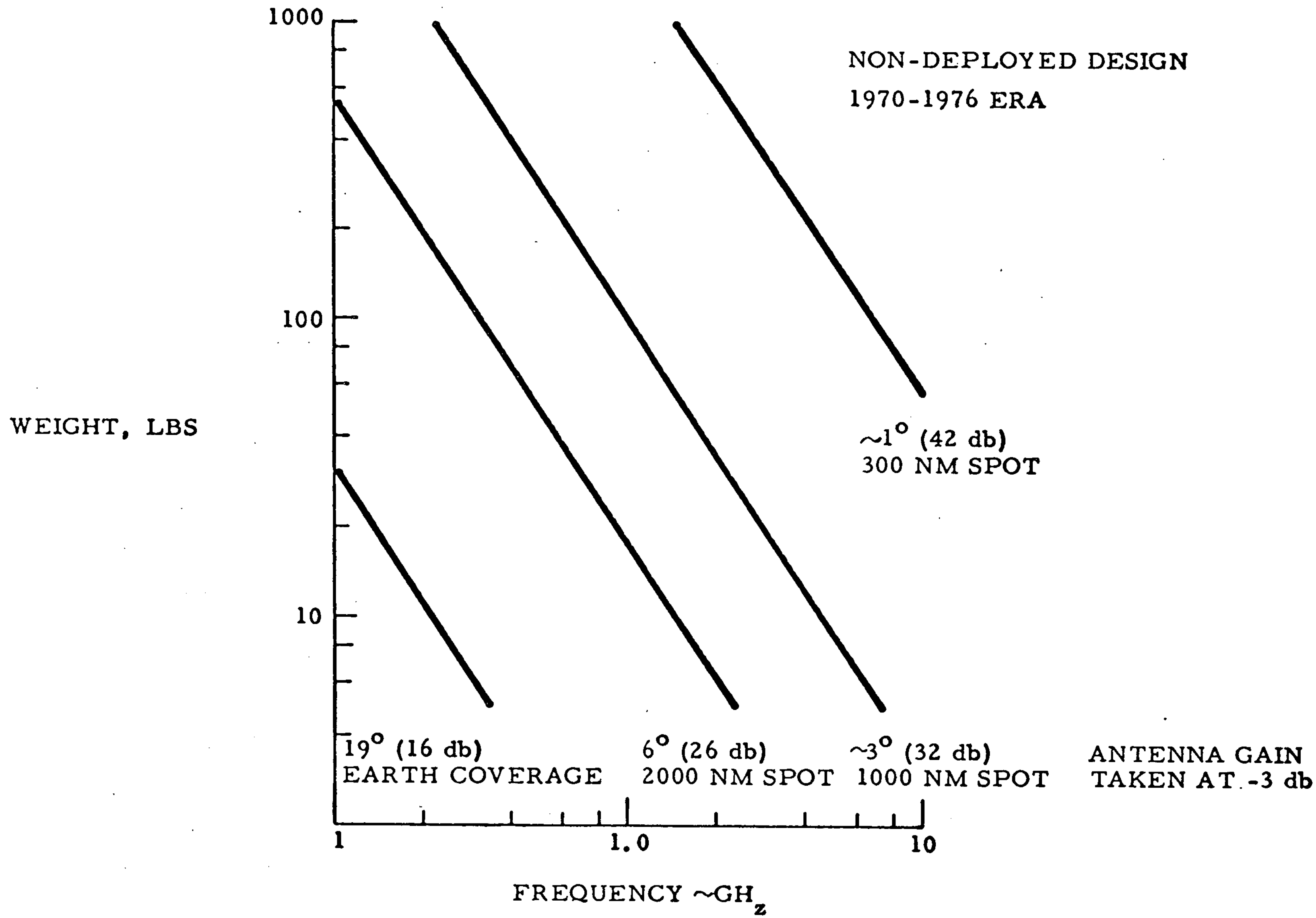


Figure 5-3. Estimated Parabolic Reflected Antenna Assembly Weight Earth Synchronous to Earth

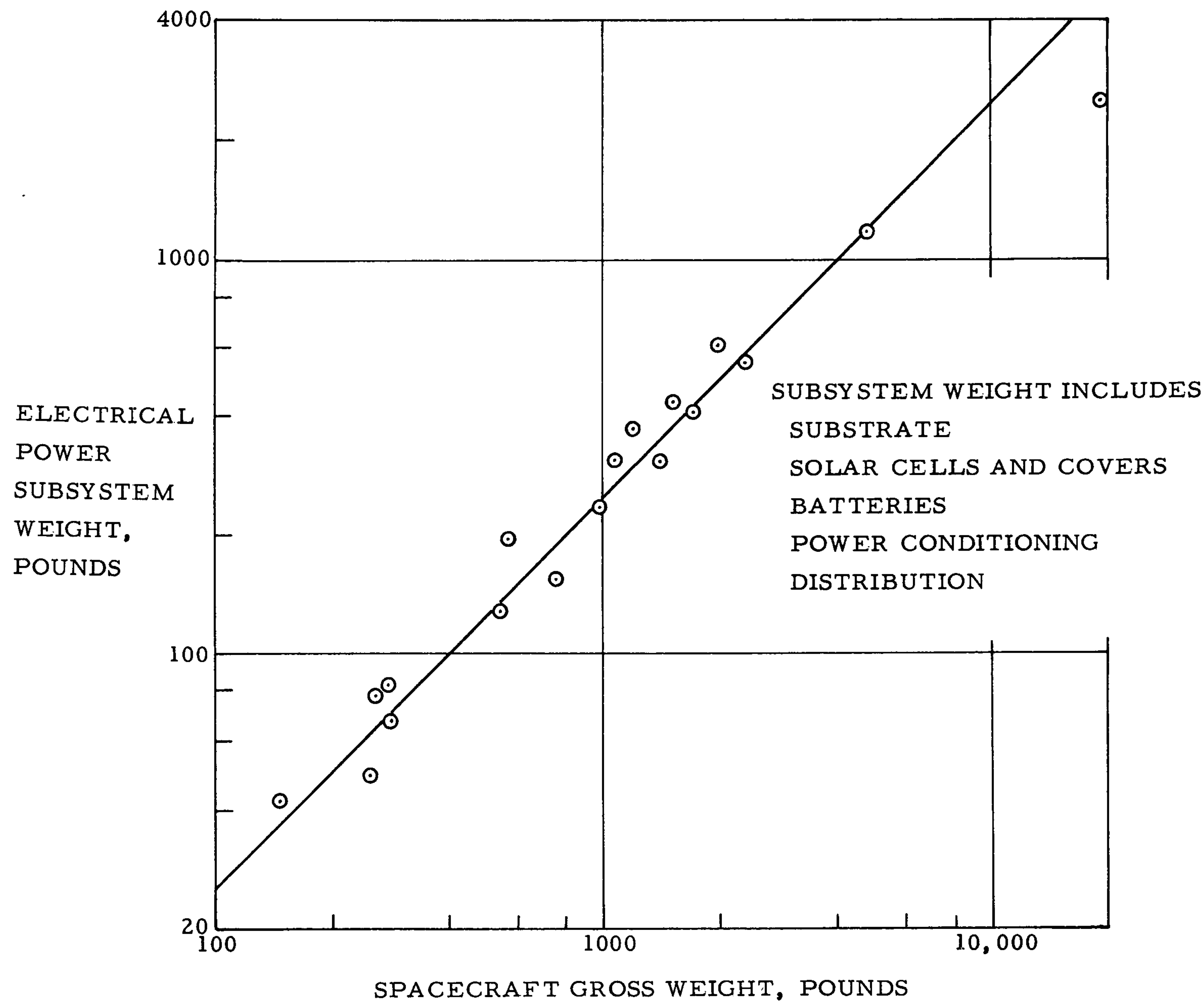
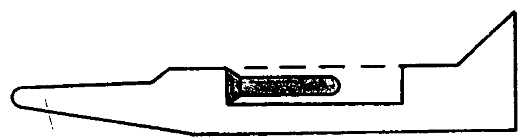
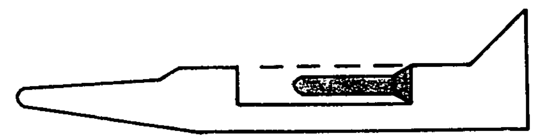


Figure 5-4. Correlation of Electrical Power Subsystem Weight With Spacecraft Gross Weight

- MOUNTING METHOD IN SPACE SHUTTLE



FORWARD



AFT

- OAO LOAD DISTRIBUTION

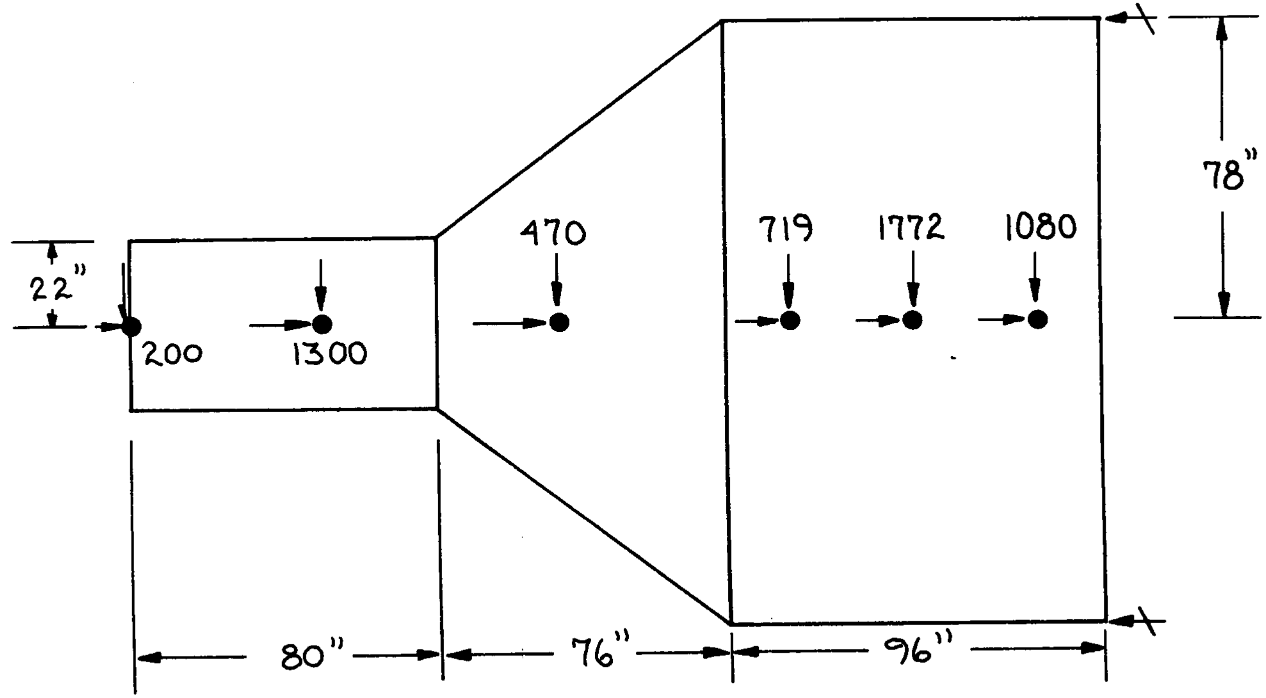


Figure 5-5. Structural Sizing Analysis

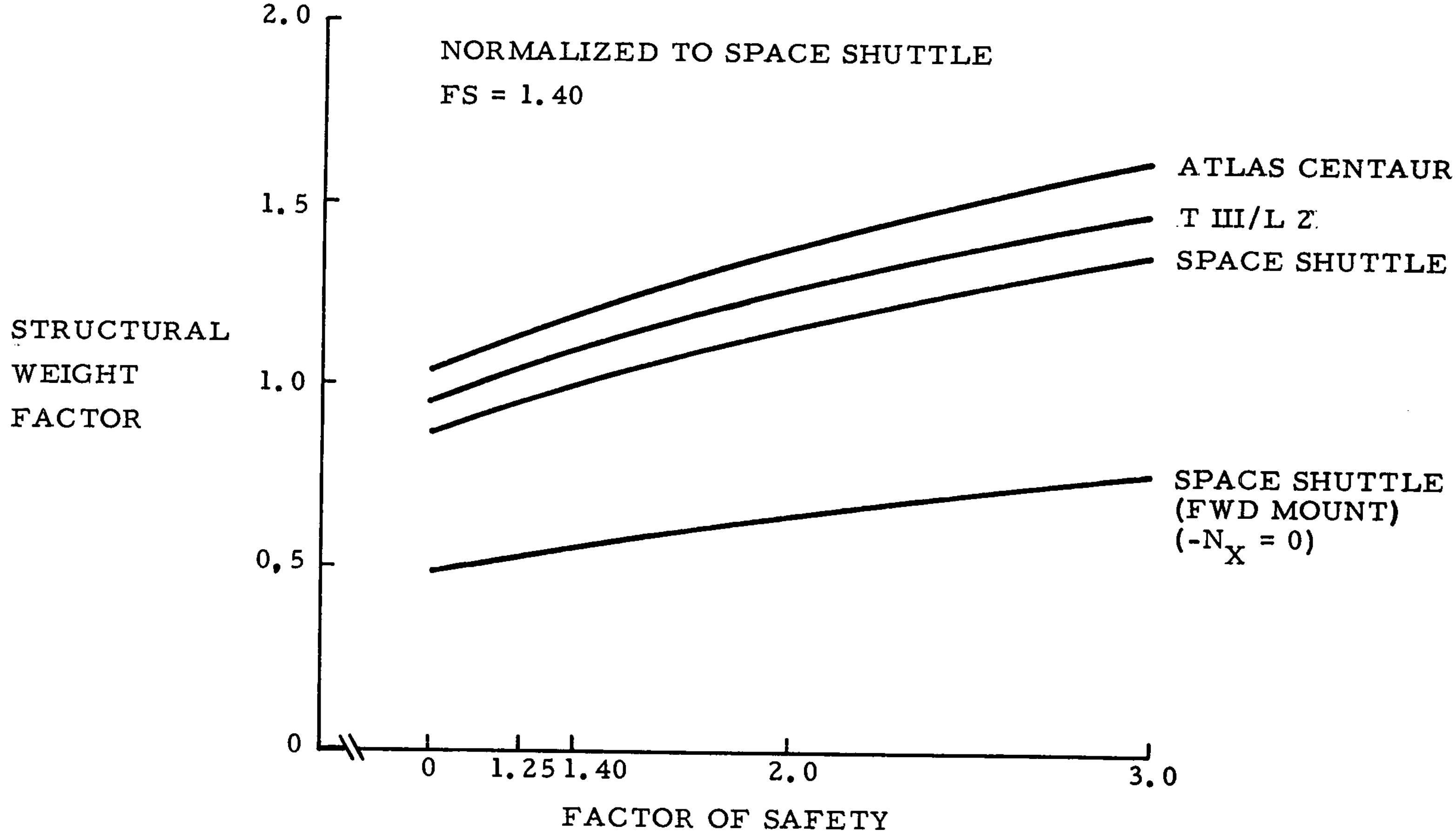


Figure 5-6. Structural Weight Factor, OAO-Type Structure

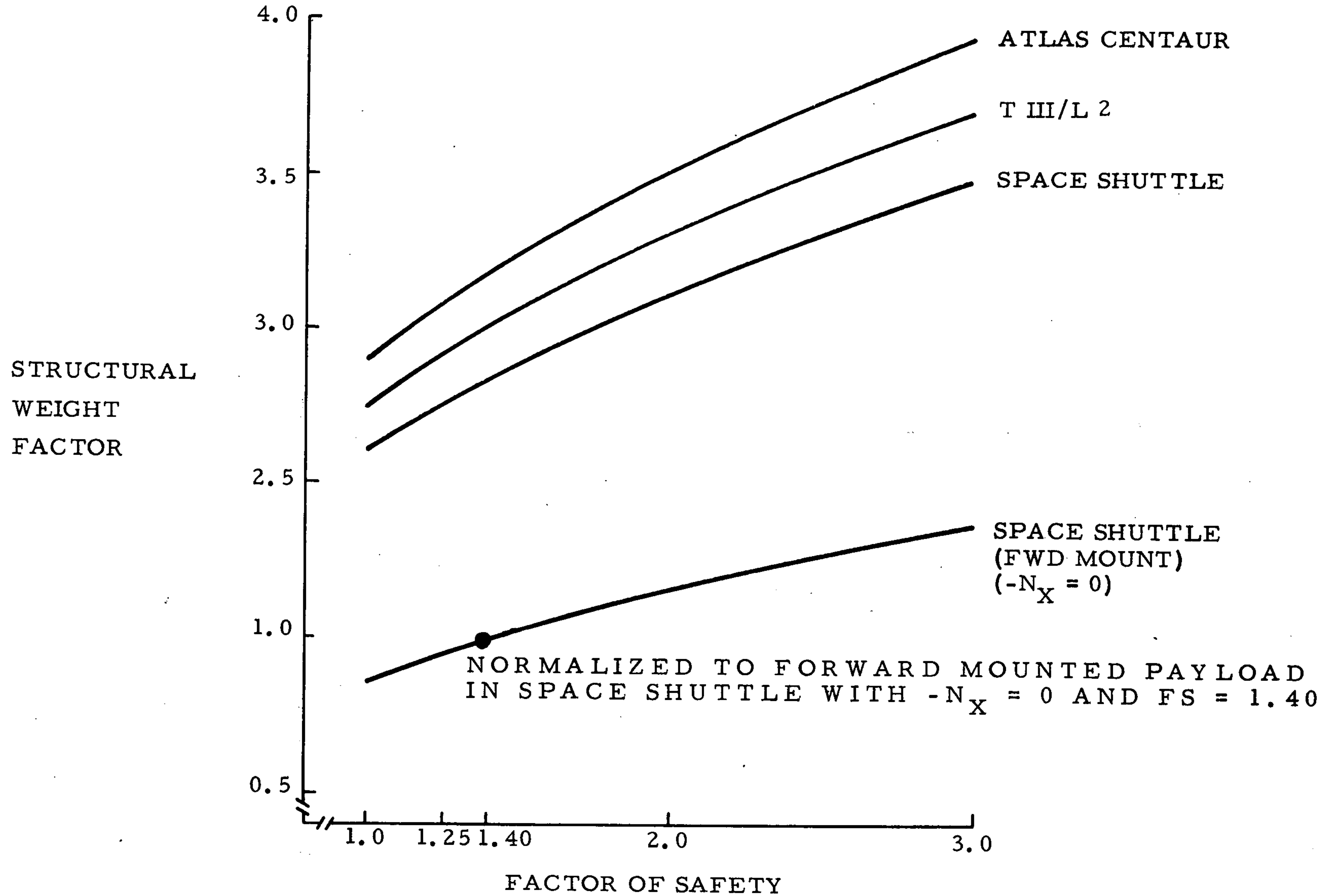


Figure 5-7. Structural Weight Factor, OAO-Type Structure

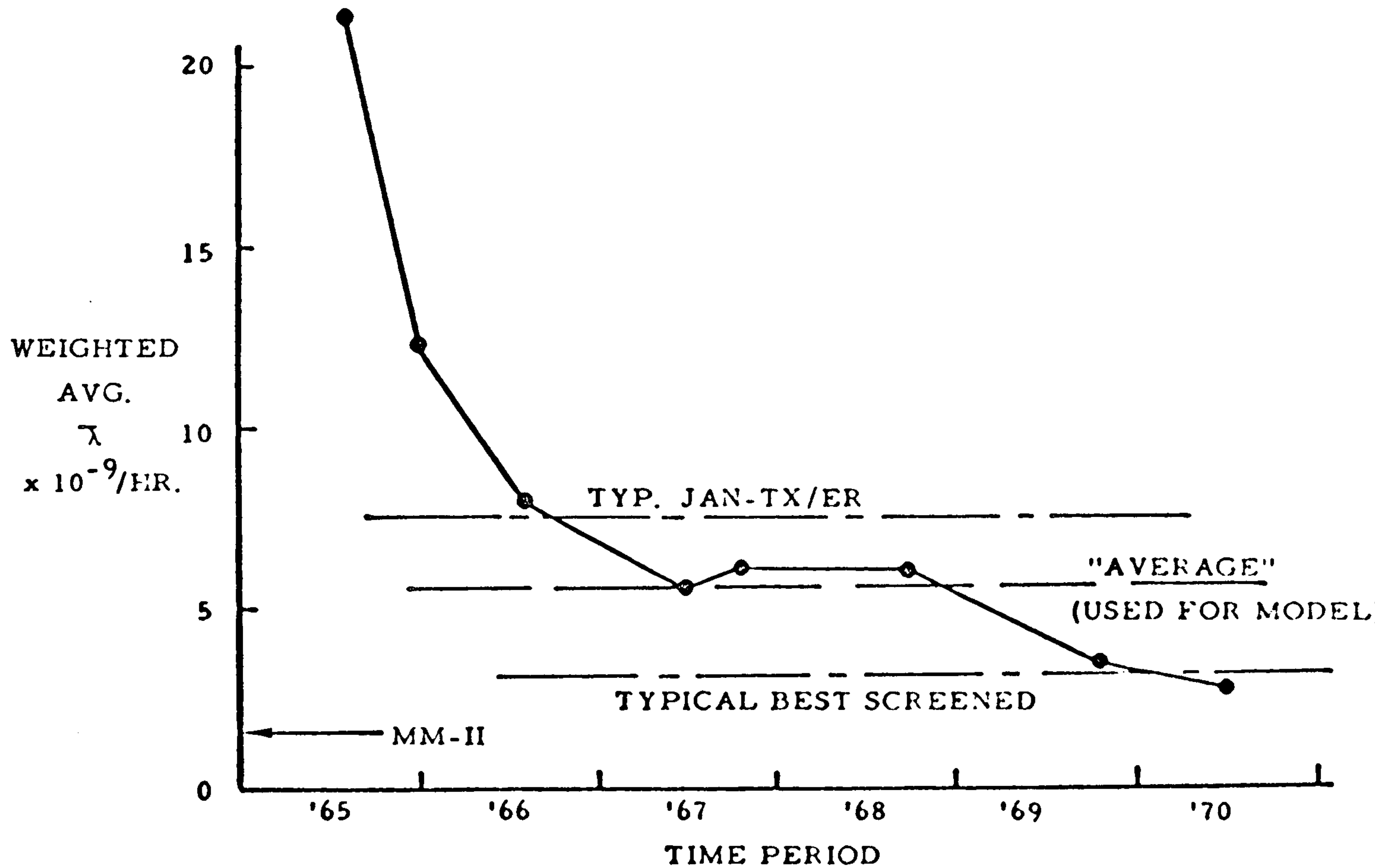


Figure 5-8. Weighted Average Part Failure Rate ($\bar{\lambda}$)
Hughes Aircraft Company Orbital Maneuver

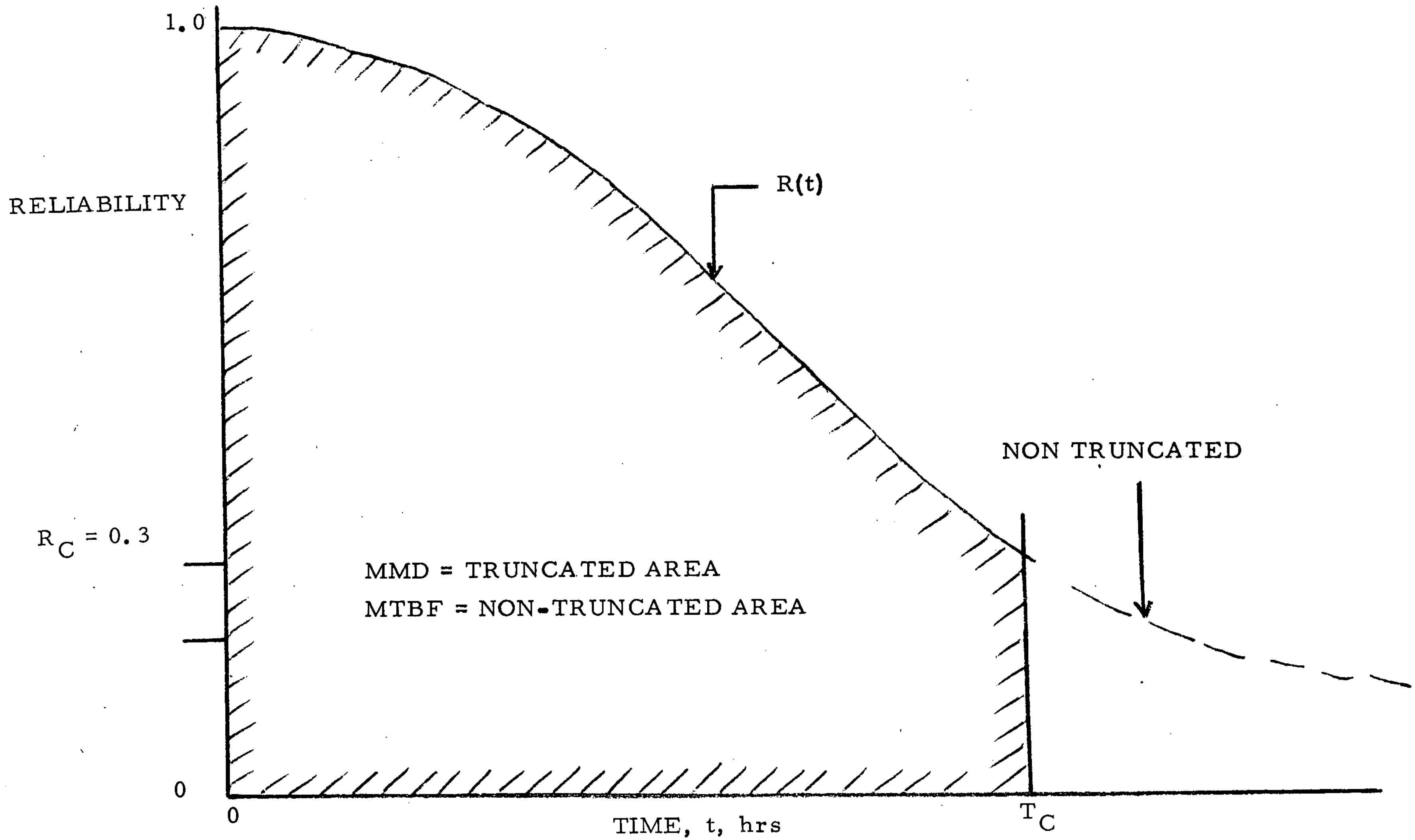


Figure 5-9. Definition of Mean Mission Duration (MMD)

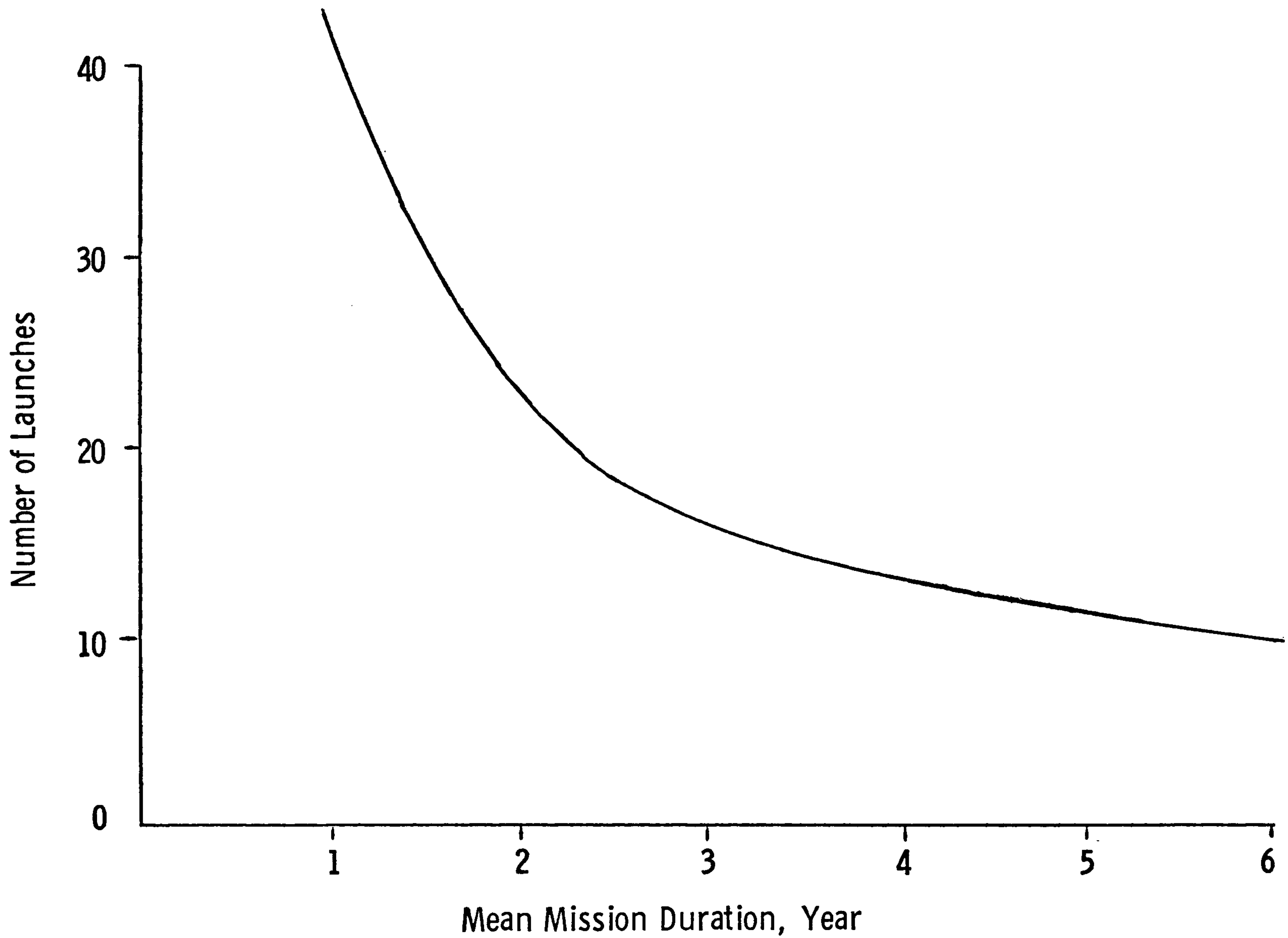


Figure 5-10. Number of Launches

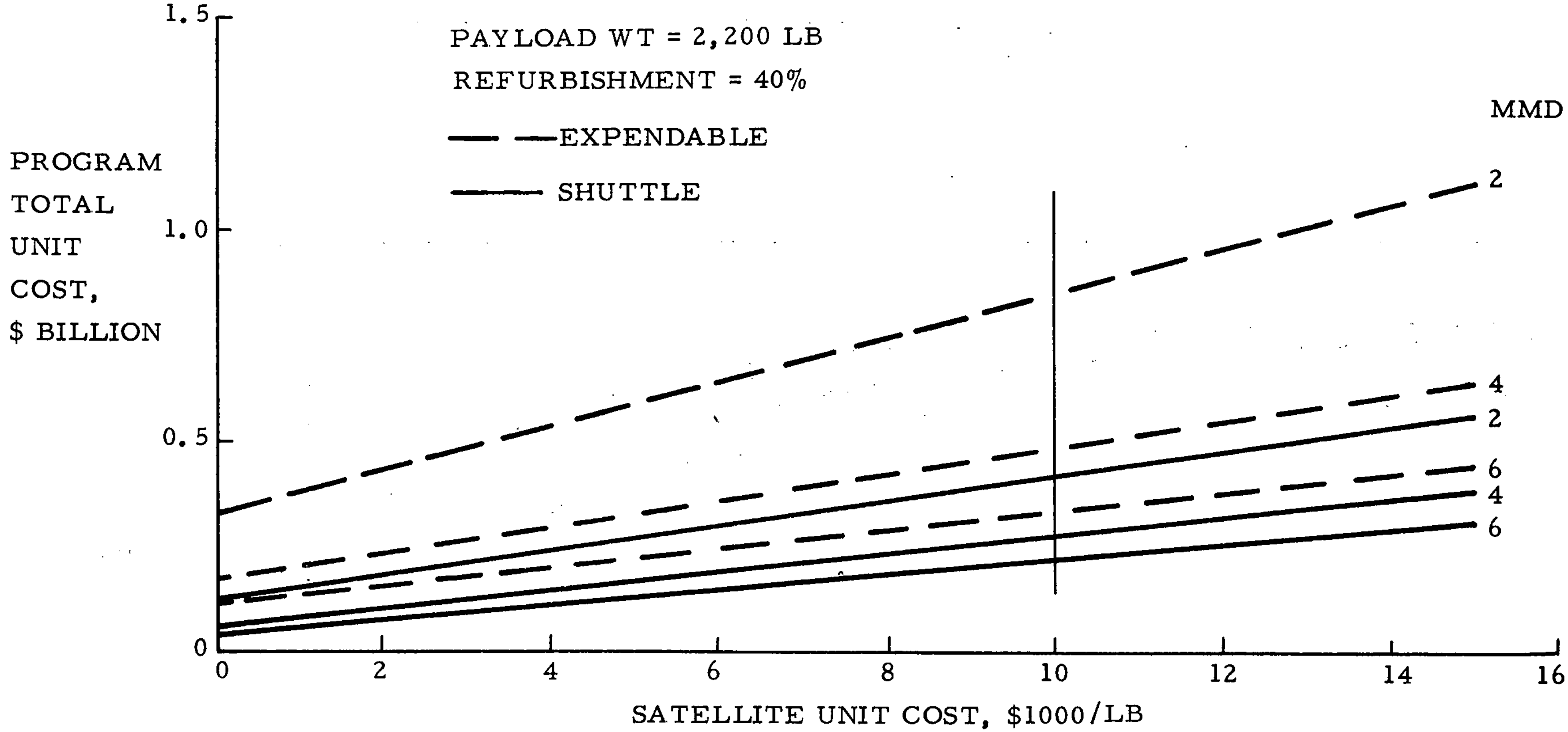


Figure 5-11. Satellite Program Total Unit Cost

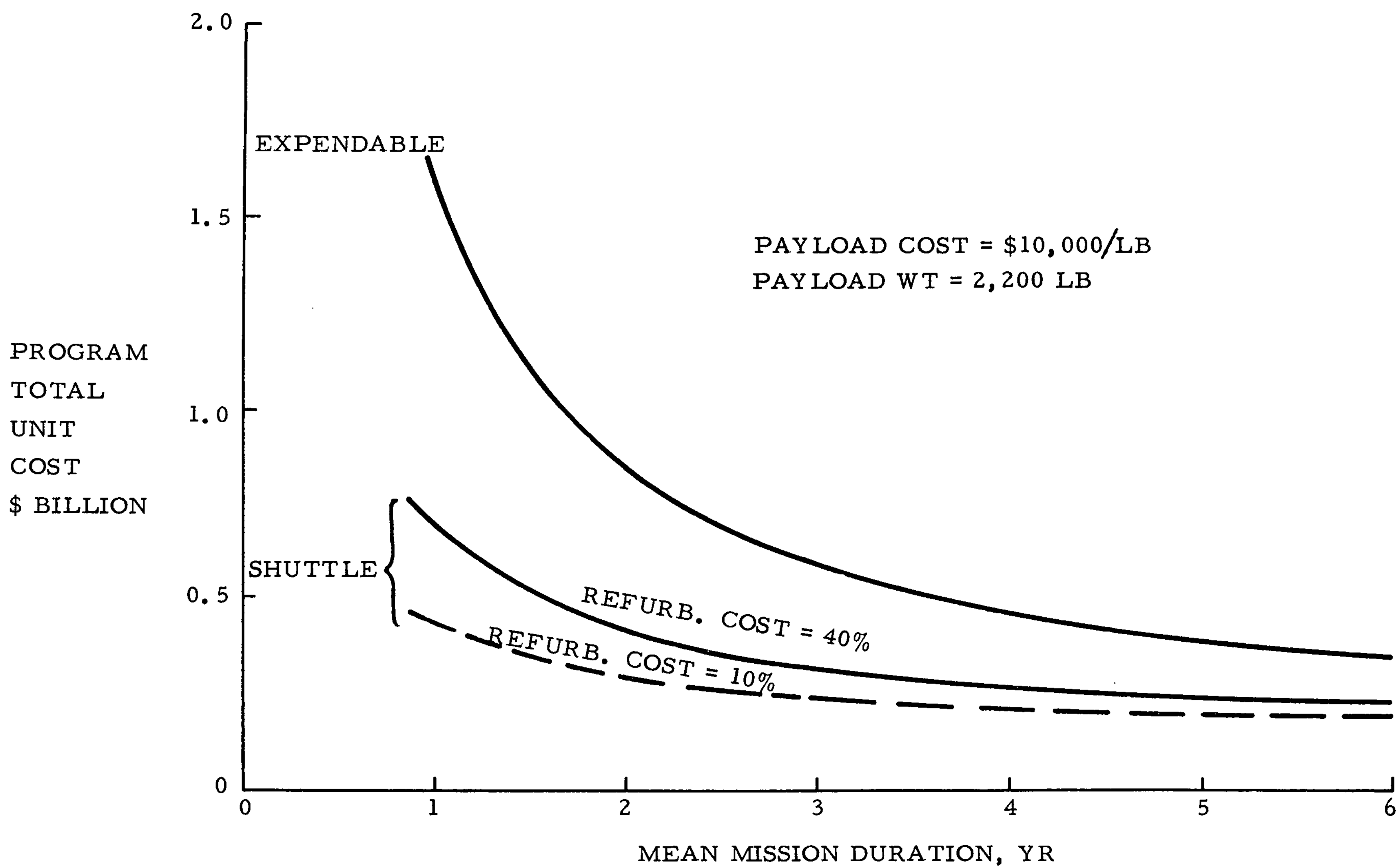


Figure 5-12. Satellite Program Total Unit Cost

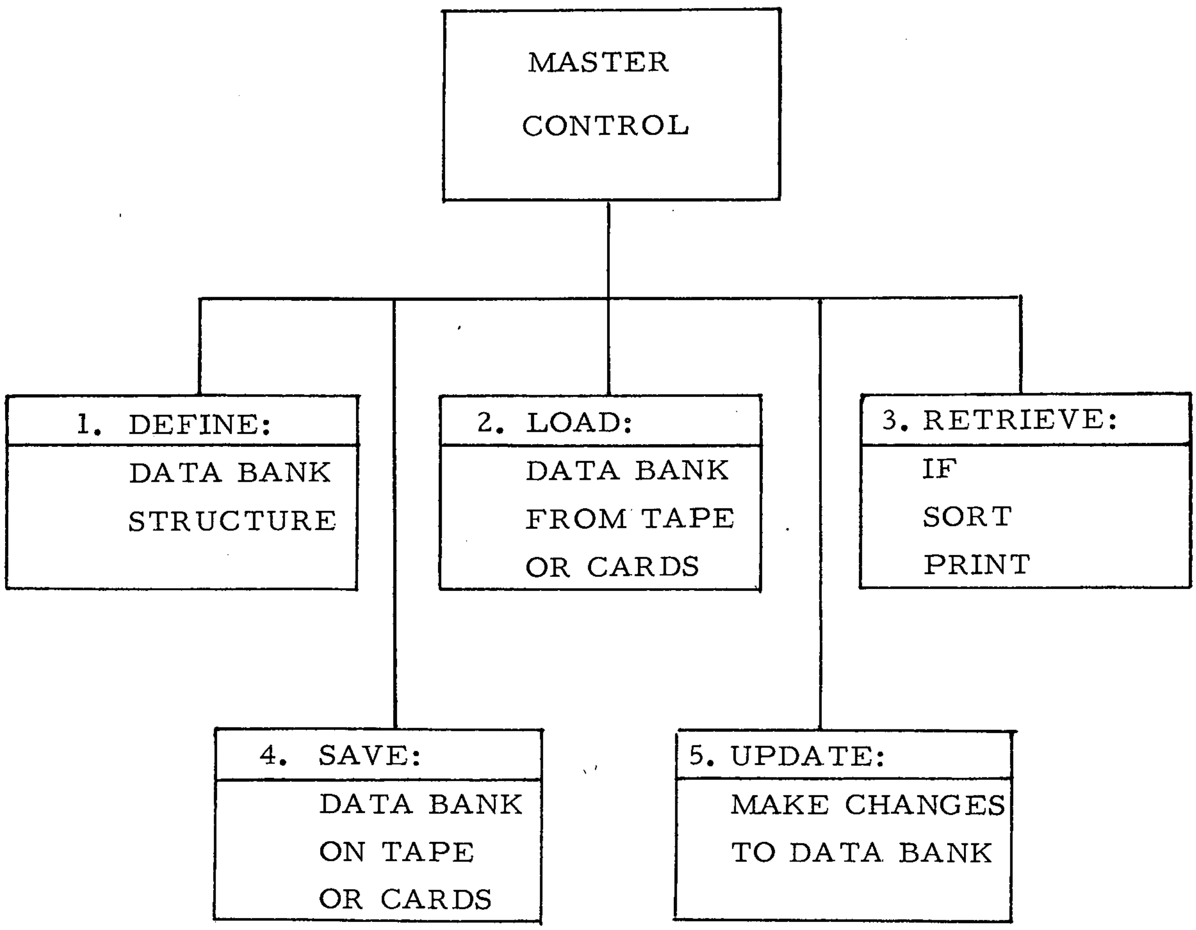


Figure 5-13. DARES Program Structure

6. OBSERVATIONS AND RECOMMENDATIONS.

The payload task of the "Integrated Fleet Analysis" was performed primarily to generate payload data for the capture and cost analysis. The following observations and recommendations can be drawn from this effort:

6.1 PAYLOADS

In generating current expendable payload data for over 90 satellites for the 1979 to 1990 era, consistency was maintained across the mission models. Even though predictions and data for a specific payload in the 1980's may be speculative, with this large number of payloads in the sample it is reasonable to expect that the mean of the projected data will follow the historical trend. Only in those cases where Phase A-type data or unique mission requirements were available was there any deviation from the satellite characteristics which are based on past and current automated satellite data.

In the future, additional Phase A data and new mission requirements will become available and the mission model may be revised. Thus the payload data are useful only as long as the mission model contains that payload. The information can be periodically updated as new data become available if the Payload Data Bank is to be used for any future economic studies.

6.2 COST REDUCTION

Satellite cost reduction by refurbishment and subsystem low cost design has been shown to be effective. These savings are possible with the use of the Space Shuttle fleet because payload volume and weight will not be a constraint for small to medium sized payloads and because of the retrieval capability.

Standardization of satellite subsystems has been shown by LMSC's parametric analysis to be effective in reducing payload costs and should be seriously considered now that many subsystems have achieved a decade of maturity. No advantages were taken on cost reductions from subsystem or component standardization in this study, although one of the low cost design principles incorporated in the LMSC low cost payload designs is the use of previously qualified hardware whenever possible.

The LMSC development program analysis for reusable payloads (Reference 29) indicated that a savings in payload test hardware is made for payloads developed in the Space Shuttle.

The influence of refurbishment cost was investigated in a simplified operational satellite program. The study indicated that if refurbishment cost can be reduced from 40 percent to 10 percent of unit cost, approximately a 20 percent reduction in the total unit program cost is possible. In this study, the refurbishment cost, as derived from the LMSC "Payload Effects Study", was used. The LMSC study objective was a low cost design effort and not a design study to minimize refurbishment cost. If the latter objective had been included in the study, it is reasonable to expect that refurbishment cost would be lower. Additional studies to determine factors influencing refurbishment cost should be pursued.

6.3 TECHNOLOGY

Throughout the study, 1970 technology was used. No technology projection was estimated or included in any of the payload information. Technology improvement over the past years has improved satellite reliability, increased satellite life, and improved mission capability. In addition to overall payload gains, each subsystem is continually being advanced. For example, laser communication, improved computers, micro electronics, composite materials, etc are providing more capability for less weight and volume, these advances occurring because of current spacecraft

demands. With the Space Shuttle, these spacecraft demands could be redirected to emphasize lower cost for improved mission capability, a reasonable technical goal since weight and volume constraints can be relaxed.

To investigate the influence or reliability gains through redundancy, a parametric analysis on one representative satellite system was performed which indicates that the cost reduction beyond three years mean mission duration (MMD) was small for Space Shuttle operation with satellite reuse for this case. Cost reductions are possible beyond three years MMD for expendable payloads; however, the net effect on payload program cost savings is small.

Based on this analysis, the influence of MMD beyond three years is small for the Space Shuttle because of payload refurbishment. Thus there appears to be small economic gain in increasing the MMD beyond current capability in the reusable mode. This characteristic should be further pursued for other satellite systems and in more detail than was considered in this study.

6.4 SHUTTLE/TUG/PAYLOAD INTERFACE

A simplified structural analysis of Shuttle/payload mounting has indicated that a significant reduction in structural weight is possible if negative g loads can be suppressed. This study compared the payload structural weight using current and low cost expendable launch vehicles and the Space Shuttle. The analysis indicated that the structural weight can be reduced by 50 percent if the negative axial load factor can be reduced. This observation results for the Space Shuttle because payloads can be forward mounted such that the payload is "pulled" during high axial load conditions whereas the expendable launch vehicle puts the payload structure into compressive conditions.

This potential Shuttle load influence should be further analyzed to determine its impact on multiple payloads, small payloads, payload/tug operation and Shuttle/tug/payload mounting. The interface for deployment/retrieval and cargo storage should be studied in a similar manner.

6.5 LOW COST PAYLOADS

The low cost payload estimates were primarily made from the LMSC SEO and OAO low cost preliminary design and analysis. Although the subsystems from these two satellites were representative of the major portion of the satellites in the mission model, additional studies of other satellites for low cost would add more confidence. These satellites should be of communication/navigation and low altitude earth observation type payloads. The applicability of low cost design principles to Shuttle launched satellites with longer MMD would be desirable; however, studies adapting the current expendable payloads for reuse may be more useful. These data would provide economic information to compare low cost reusable designs and current expendable payloads adapted for reuse. Also, the data will provide information on phasing current expendable payloads with the Space Shuttle for those payloads currently planned.

6.6 UNMANNED PAYLOAD PROGRAM OPTIONS WITH THE SPACE SHUTTLE FLEET

It is recommended that unmanned satellite program planners and managers exercise the following tradeoffs for Space Shuttle fleet payloads:

1. Design satellites for reuse
   a. Refurbishment (+)* or continuing periodic maintenance (+)
   b. Add retrieval hardware (−)

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* Tradeoff studies on the above options generally indicate cost savings when a (+) is shown but require added hardware costs, shown as (−), or in some cases additional launch costs.

2. Modify operating spacecraft for maintainability
   a. Modify satellite (—)
   b. Lower maintenance and refurbishment costs (+)
3. Reduce payload losses
   a. Take advantage of increased launch success ratio (+)
   b. Alleviate infant mortality failures (on-orbit checkout) (+)
   c. Reduction in need for backup payloads (+)
   d. Provide satellite failure warning (—)
4. Apply low cost design principles to payloads (+)
   a. Provide orientation to designers on the effects of payload design on program cost
   b. Furnish cost targets to subsystem designers in preference to weight and dimensional constraints
   c. Identify payload design areas in which cost savings can accrue as a result of the use of the Space Shuttle
   d. Modularized design approach
   e. Ruggedized simple structure
   f. Use of qualified hardware
5. Reduce RDT&E hardware by about one equivalent spacecraft (+)
6. Long life (3 to 5 year MMD) reusable spacecraft (with redundancy) are economically attractive (+)
   a. Reduce yearly maintenance
   b. Mission equipment may have lower MMD than the spacecraft
7. Sustaining engineering lower for operational systems using reusable payloads (+)
   a. Adopt "model change" approach

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APPENDIX 1
DATA RETRIEVAL SYSTEMS (DARES)

The DARES computer program (Reference 27) was conceived to select, process and tabulate a few characteristics from a list of items. DARES gives a user who may have several items having common characteristics, who may wish to focus his attention on a selected few of the characteristics to the exclusion of all others, a means of accomplishing the process quickly and accurately on a computer. With this system, the user describes the individual characteristics of the payload and provides the massive amounts of numerical information for each item and each characteristic. This numerical information is referred to as the payload data base.

Once the payload data base has been set up, the user can call for retrieval of information. In this mode, specific satellites can be qualified for printout. For example, print the name and the launch weight of all satellites whose launch weight is between 2000 and 3000 lb. The computer is used to perform the interrogations of the Data Bank.

The overall structure of DARES was designed with six major modules as shown in Figure 5-13. It should be recognized that the computer program is still in the development stage and some of the indicated capabilities are not implemented yet in the program or even completely defined; however, it was sufficiently developed to perform the Data Bank task of the study. The complete printout of the NASA and non-NASA payloads are included in Appendix 3. The program is defined in the following section.

1.1 OVERALL DESIGN

The master control block shown on Figure 5-13 initializes the program and performs the decision-making for selecting the application of the other modules described below. Each module performs its restricted application and upon completion gives control back to the master control. The process is repeated until the master control determines that there

are no more operations to be performed. At that time the computer program terminates its activities.

1. The define module is used to give DARES a list of characteristics describing a Data Bank about to be established.

2. The load module establishes the Data Bank by processing the numerical information to be loaded into the computer for each satellite included in the Data Bank.

3. The retrieve module permits the user to perform some basic arithmetic calculation, to qualify some or all satellites for printout and to request those characteristics to be printed for each qualified satellite.

4. The save module permits the user to save the Data Bank on magnetic tape. In subsequent computer runs the user could then bypass the lengthy define and load processes and use the faster option of load from magnetic tape.

5. The update module permits the user to take a Data Bank established on magnetic tape and to alter the data to bring it up to date with the current thinking.

The preferred order of processing is to use the define and load modules to establish the Data Bank, or the Data Bank could be established by a load from magnetic tape with or without usage of the update module. Once the Data Bank is established, it can be saved and many retrievals performed against the Data Bank.

1.2 GENERAL INPUT

Data input to DARES on cards is of a free form nature. The program scans the entire card seeking all data. Blanks are recognized as separators between words. In some instances the input format demands parentheses for proper recognition of what is meant by the contents of the card. Names may contain blanks between the two or more parts; e.g., LAUNCH WT. The program reduces the number of such blanks to one. Names are carried in two forms, with and without blanks, in order to more fully recognize them.

1.3 DEFINE MODULE

The process within DARES is general in concept, adaptable for a satellite Data Bank, a computer magnetic tape library or a library of technical books. Each item in the Data Bank processes a group of common characteristics; e.g., satellite launch weight, date magnetic tape was written, or author of book. The user describes the characteristics by means of a table of contents.

Control is passed from the master control block to the define module when the command DEFINE is encountered.

The table of contents is processed by the define module until the command END OF DEFINE is encountered. Control is then passed back to the master control block.

A single entry in the table of contents has the form:

PPNN) NAME (TYPE)

where: PP is the optional prefix. A prefix is assigned to groups of characteristics which would ordinarily be printed together. An example would be: the weight breakdown of the satellite might have all elements prefixed with "WT."

NN is an identifying number which will be used as a reference during the loading of numerical information. There is no requirement that the numbering system be in any specific order; however, to reduce confusion each number should appear only once.

) This parenthesis is required

NAME is a name given to the characteristic. This name cannot contain more than 10 letters (machine restriction). The name will be used in the retrieval process.

(This parenthesis is required

TYPE has four alternative forms that are used for formatting the printouts and validating the input values: 1) INTEGER for controlling numeric entries to exclude fractional parts; 2) NAME for specifying that the input data will contain alphabetic characters, e.g., launch vehicle is SCOUT; 3) REAL for controlling numeric entries with fractional parts; and 4) DATE input in the form 3/4/71. The DATE capability is currently not implemented.

) This parenthesis is required

The above format is used to define the characteristics of the Data Bank. Each characteristic is entered on a separate card. The end of the table of contents is marked by END OF DEFINE appearing anywhere in the card.

1.4 LOAD MODULE

This module will accept all the numeric and alphabetic entries to establish the data base. The command LOAD FROM CARDS will force the master control block to pass control to the load module for processing the input data. The end of the loading process is marked by the command END OF LOAD. When this card is encountered, control is given back to the master control block.

The input card format for data loading is:

NN) VALUE b

where: NN is a reference number defined in the table of contents. If NN is not defined, the program issues an error message and the VALUE is rejected.

) This parenthesis is required

VALUE is the information to be supplied for this characteristic. NAME entries are restricted to a maximum of 10

letters. If the length is excessive, an error message is issued, and the first 10 letters are kept. No punctuation is permitted in NAME entries.

b is at least one blank following the value.

The comment about trailing blank is important for the program uses the blank to recognize the separation between multiple data entries on a card of the form:

NN) VALUE NN) VALUE NN) VALUE

The reference numbers may occur in any order and may be used several times, the last usage providing the final value. No group of the form NN) VALUE is permitted to go around the corner; that is, part of the group at the end of one card and the remainder at the beginning of the next card.

The end of the data for an item (satellite) is marked by the special group))END. The next card begins the data for the next satellite, or it may be the command END OF LOAD, terminating the data loading process.

Each value, regardless of type, can be marked for special handling by entering the words NONE or NA (not applicable). Any reference number not used in loading data for a satellite is automatically given the unique value NO ENTRY. These three reserved words are recognized during the retrieval process.

The command LOAD FROM MAGNETIC TAPE has not been implemented.

1.5 RETRIEVAL MODULE

This module will yield printouts of satellites selected from the Data Bank based on criteria provided on input cards. The command RETRIEVE will signal the master control block to pass control to the retrieve module. The end of the retrieval process is marked by the command END OF RETRIEVE. The capabilities of the retrieve module are summarized in the following description of the sections of the module.

1.5.1 Arithmetic/Logical IF Interpreter

This section processes the FORTRAN-like arithmetic statements used to perform the basic calculations available to the user and logical IF statements used to determine whether or not a satellite qualifies for printout. The interpreter processes the statements converting them into internal tables to be used as the guide when actually performing the calculations. The basic form of the logical IF is:

IF NAME1 comparator NAME2

where: NAME1 and NAME2 are possibly names defined in the table of contents or a relevant numeric or alphabetic constant.

Comparator - is one of the short forms NE, EQ, LE, LT, GE, GT representing not equal, equal, less than or equal, less than, greater than or equal, greater than.

The description may be clarified by a few examples:

IF LAUNCH WT LT 10000

IF LAUNCH VEH EQ TITAN III

IF CØDE EQ NAS-10

There is a simple restriction to be adhered to; numerics are not to be compared against alphabetics.

The significance of the logical IF is best illustrated by the following example and its detailed interpretation. Consider the four cards:

```
RETRIEVE
IF LAUNCH WT GE 10000
PRINT CODE, LAUNCH WT
END OF RETRIEVE
```

The interpretation is: enter the retrieve module, screen all satellites to find those satellites whose launch weight is greater than 10000 lbs, and print a summary giving the code name and launch weight of those satellites for whom the logical IF is true. The IF statement acts as a barrier saying in effect: if the statement is true, continue processing the information pertaining to this satellite. Otherwise discontinue processing and obtain the information for the next satellite.

Any of the reserved words NONE, NA, and NO ENTRY can be used as a constant in the IF statement to determine if the data entry exists or is not applicable, etc.

As an IF statement acts as a barrier, two IF statements in succession act together as an AND ing type of operation. The double barrier is passed if both IF number 1 and IF number 2 are both true.

The basic form of the arithmetic statement is:

```
COST = LAUNCH WT * 5.25
```

which is interpreted to mean: define a new variable (or redefine an old variable) COST as having the value of the launch weight of the satellite costing $5.25 per lb. The * is an operator; the valid operators are +, -, *, /, **. An operator always appears between names and/or constants.

Both arithmetic and IF statements consist of names/constants separated by operators or comparators. The complete list in order of precedence is:

Operator	Significance
**	exponentation
/	division
*	multiplication
-	subtraction
+	addition
LT	less than
LE	less than or equal
EQ	equal
NE	not equal
GE	greater than or equal
GT	greater than
AND	logical AND
OR	logical OR
=	replacement

The interpreter processes the entire statement, collecting groups of name-operator-name and based on the order of precedence of operators, converts groups into intermediate results to be used as a name in another group. Thus the statement:

A = C * D/E**2+B means
square E, divide that into D,
multiply that by C, and
add that to B and put the result in A.

1.5.2 Sort Interpreter

This section processes the sort statement of the form

SORT A, -B, C, D

where: A, B, C, D are names defined in the table of contents or defined as the result of a calculation.

The sort is of ascending nature except when specified as descending on a particular name or names by the presence of a loading minus sign. This section has not been implemented.

1.5.3 Print Interpreter

This section processes the print statement controlling the selection of the variables to be printed. Multiple print statements add to the list. There is no control over the format or structure of the report generated. If a satellite qualifies for printout, then the print can be requested in three forms.

(1) The individual characteristic print request is:

PRINT LAUNCH WT, CODE, COST

where: LAUNCH WT, CODE and COST are names defined in the table of contents or defined as the result of a calculation.

This print request permits the user to select precisely the characteristics he wishes to investigate. The format of the printout of an individual element is controlled by the type specification in the table of contents. Results of calculations are automatically defined as type REAL.

(2) The request for a group printout is of the form:

PRINT ALL-PP

where: PP is a prefix appended to each entry in the table of contents of a group of associated characteristics. For example, the weight breakdown of the satellite could be identified by the prefix WT and the group printed on the command of PRINT ALL-WT.

(3) A special all-encompassing printout is achieved by the simple statement:

PRINT ALL

which causes all characteristics to be printed in the order of the table of contents.

1.5.4 The Data Bank Processor

This section of the retrieve module performs the actual work of retrieval. A satellite is obtained from the Data Bank and the processing required of the arithmetic and logical IF statement is performed. Should the satellite qualify for printout, the printing is done according to the print specifications. The process is repeated for all satellites in the Data Bank.

1.6 SAVE MODULE

This module will save the Data Bank in a format suitable for reloading at a later date. Either the command SAVE ON MAGNETIC TAPE or the command SAVE ON CARDS will force the master control block to pass control to the save module for saving the Data Bank. The end of the saving process is marked by the command END OF SAVE.

The command SAVE ON MAGNETIC TAPE causes the internal Data Bank structure table and the Data Bank to be output on a magnetic type for later reloading via the command LOAD FROM MAGNETIC TAPE.

The command SAVE ON CARDS causes the Data Bank table of contents and the Data Bank to be output on cards for later reloading via the commands DEFINE and LOAD FROM CARDS. The punched deck will contain the necessary command cards to assure complete compatibility.

This module has not been implemented.

1.7 UPDATE MODULE

This module will permit easy alteration of a previously defined Data Bank without referring to the data cards supplied as input to the load module. The command UPDATE will force the master control block to pass control to the update module for the updating process. The end of the updating process is marked by the command END OF UPDATE.

This module is only partially defined and not implemented at this time. The card formats are not defined, but the options within the update module should include the following:

1. Addition and deletion of characteristics in the table of contents.
2. Addition and deletion of entire satellites from the Data Bank.
3. Alteration of individual values belonging to specific satellites.
4. Alteration of individual values on a global scale subject to qualification, e.g., change the launch vehicle SCOUT to TITAN III wherever SCOUT is the launch vehicle.

APPENDIX 2
KEY TO DATA BANK PRINTOUT

This Appendix consists of the following tabulations of "Payload Characteristics for Data Bank."

Payload Characteristics for Data Bank

Area	Characteristic	Characteristic Abbreviated	Column	Example (fictitious)
Programmatics	Title	Title	PN1	30 Letter Entry
	Data Book Designation	Dta Bk Des	CD4	NAS-1
	Program	Program	P5	NASA Astro
	Mission Model Designator	Payload	P6	Curr. Exp.
	Agency	Agency	P8	NASA
	Mission Objectives	Miss Objec	MO10, 11, 12	70 Letter Lines
Number Satellites in System	Number Satellites in System	No Sats	N21	1
Characteristic Velocity	Characteristic Velocity, fps	Char Veloc	V26	26,480
Orbit Parameters	Circular Orbit Altitude, n mi	Circ Altit	031	400
	Nominal Inclination, deg	Nom Inclin	032	30
	Nominal Apogee, n mi	Nom Apog	033	400
	Nominal Perigee, n mi	Nom Perig	034	400
	Nominal Eccentricity	Nom Eccent	035	0
	Maximum Apogee, n mi	Max Apog	040	500
	Minimum Apogee, n mi	Min Apog	041	350
	Maximum Perigee, n mi	Max Perig	042	500
	Minimum Perigee, n mi	Min Perig	043	350
	Maximum Inclination, deg	Max Inclin	044	30
	Minimum Inclination, deg	Min Inclin	045	28.5
Launch Vehicles, Sites	Launch Window, days	Lch Window	LV60	20
	Launch Vehicle 1	Lch Veh 1	LV61	Titan III
	Launch Site 1	Lch Site 1	LV63	ETR

Payload Characteristics for Data Bank (continued)

Area	Characteristic	Characteristic Abbreviated	Column	Example (fictitious)
Launch Dates	Initial Launch Date	In Lch Date	D71	1979
	Flights, 1979	Flts 1979	D73	1
	Flights, 1980	Flts 1980	D74	0
	Flights, 1981	Flts 1981	D75	1
	Flights, 1982	Flts 1982	D76	0
	Flights, 1983	Flts 1983	D77	1
	Flights, 1984	Flts 1984	D78	0
	Flights, 1985	Flts 1985	D79	1
	Flights, 1986	Flts 1986	D80	0
	Flights, 1987	Flts 1987	D81	1
	Flights, 1988	Flts 1988	D82	0
	Flights, 1989	Flts 1989	D83	1
	Flights, 1990	Flts 1990	D84	0
	Total Number of flights	Total Flts	D85	6
Lifetime	Maximum System Expected Lifetime,yr	Sys Lf	L91	10
	Mean Mission Duration, yr	MMD	L95	2
Maintenance, Refurbishment	Type of Maintenance or Refurbishment	Typ Mnt Re	M101	MNT/R
	Expected Maintenance Phiolosophy	Exp Mnt Ph	M102	MNT
	Maximum Payload Per Visit, lb	Mx Pld Vst	M103	5000
	Minimum Payload Per Visit, lb	Mn Pld Vst	M104	5000
Launch Dimensions	Launch Volume, ft^3	Lch Volume	LD111	1570
	Launch Length, ft	Lch Length	LD112	45
	Launch Diameter, ft	Lch Diam	LD113	13
Sensors	Sensor 1	Sensor 1	S121	TV Camr
	Sensor 2	Sensor 2	S122	Photo Camr

Payload Characteristic for Data Bank (continued)

Area	Characteristic	Characteristic Abbreviated	Column	Example (fictitious)
Sensors	Sensor 3 Sensor 4 Sensor 5	Sensor 3 Sensor 4 Sensor 5	S123 S124 S125	Spctrgrphs NA NA
Pointing Accuracy	Pointing Accuracy, sec	Point Acc	PA131	NA
Power	Average Power, watts	Av Pwr	PR151	2000
Structures Mechanisms, Vehicle Assembly Weight	Structures, Mechanisms, Vehicle Assembly Weight, lb	St M V A W	WS161	(2000)
Environmental Control Weight	Environmental Control Weight, lb	Env Cont W	WE171	(500)
Guidance, Navigation, Stabilization Weight	Guidance, Navigation, Stabilization Weight, lb	Gd Na St W	WG181	(700)
Propulsion Weight	Propulsion Weight, lb Propellant Weight, lb	Prop W P Propel W	WP191 WP192	(400) 350
Attitude Control (Mass Expulsion) Weight	Attitude Control (Mass Expulsion) Weight, lb Propellant Weight, lb	A C W A C Prop W	WA201 WP202	(50) 40

Payload Characteristics for Data Bank (continued)

Area	Characteristic	Characteristic Abbreviated	Column	Example (fictitious)
Telemetry, Tracking, Command Weight	Telemetry, Tracking, Command Weight, lb	TTC W	WT211	(300)
Electrical, Pyrotechnics Weight	Electrical, Weight, lb	ELECT W	WEP221	(60)
Mission Equipment Weight	Mission Equipment Weight, lb	Miss Eq W	WM231	(8000)
Weight Totals	Total Weight - Dry, lb Total Weight - Including Expendables, lb Adapter Weight, lb Launch Weight, lb	Total D W To W In Ex Adapter W Launch W	W241 W242 W243 W244	11620 12010 120 12130
Structure	Type of Structure	Type St	Type 300	Exo
Propulsion	Type of Propulsion	Type Prop	Type 310	Liquid
Propellant	Type of Propellant	Type Propel	Type 320	Hydrazine
Attitude Control	Type of Attitude Control	Type A C	Type 330	3-Axis
Electrical Power Kick Stage	Type of Electrical Power Type of Kick Stage	Type EP Type Kick St	Type 340 Type 350	Solar Centaur
Unit Cost	Structure Unit Cost, \$ Electrical Unit Cost, \$ Tracking & Com. Unit Cost, \$	St U C Elect U C TTC U C	C410 C420 C430	200,000 300,000 400,000

Payload Characteristics for Data Bank (concluded)

Area	Characteristic	Characteristic Abbreviated	Column	Example (fictitious)
Unit Cost ($)	Stabilization and Control Unit Cost, $	Stab U C	C440	500,000
	Propulsion Unit Cost, $	Prop U C	C450	100,000
	Total Spacecraft Unit Cost, $	SC Unit Cost	C460	1,500,000
	Mission Equipment Unit Cost, $	Miss Eq U C	C470	600,000
	Total Unit Cost, $	T Unit Cost	C480	2,100,000
RDT Cost ($)	Structure RDT Cost, $	St R C	C510	3,000,000
	Electrical RDT Cost, $	Elect R C	C520	2,000,000
	Telemetry, Tracking, and Comm. RDT Cost, $	TTC R C	C530	5,000,000
	Stabilization and Control RDT Cost, $	Stab R C	C540	10,000,000
	Propulsion RDT Cost, $	Prop R C	C550	5,000,000
	Total Spacecraft RDT Cost, $	SC R C	C560	25,000,000
	Mission Equipment RDT Cost, $	Miss Eq R C	C570	30,000,000
	Total RDT Cost, $	T RDT Cost	C580	55,000,000
Operations Cost ($)	Total Operations Cost, $	T Ops Cost	C610	1,000,000
Total Cost ($)	Total Payload Cost, $	T Pay Cost	C620	58,100,000

APPENDIX 3
LOW COST PAYLOAD DATA SHEETS

C.3

Low Cost Payload Characteristics

Large Stellar Telescope, NAS-1

Date: 24 April 1971

Name	Current Expend-able	Expend-able Factor	Shuttle Factor	Low Cost Expend-able	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	10/2			10/2	10/2	Payload has been conceptually designed for expendable	
Launch Volume, Ft^3	6,000			6,000	6,140	and shuttle use by funded study. The Grumman study indicated little change when it is redesigned for shuttle.	
Launch Length, Ft	45			45	46	On-orbit maintenance is used to replace failed parts only. This is achieved by shuttle docking to the LST/OAO	
Launch Diameter, Ft	13			13	13	and change out is achieved by remote manipulator. Low cost concept does not apply because of the limited space (15'D x 60'L).	
Structure/Mechanism Weight, Lb	8,650	1.0	1.0	8,650	8,650		BL
Environmental Control Weight, Lb	1,300	1.0	1.0	1,300	1,300		BL
Guidance/Navigation and Stabilization Weight, Lb	770	1.0	1.0	770	770		BL
Dry Propulsion Weight, Lb	0	-	-	0	0		-
Propellant Weight, Lb	0	-	-	0	0		-
Dry Attitude Control Weight, Lb	185	1.0	1.0	185	185		BL
Propellant Weight, Lb	315	1.0	1.0	315	160	Assume yearly resupply of exp.	BL
TT&C Weight, Lb	500	1.0	1.0	500	500		BL
Electrical Weight, Lb	1,310	1.0	1.0	1,310	1,310		BL
Mission Equipment Weight, Lb	8,270	1.0	1.0	8,270	8,270		BL
Total Dry Weight, Lb	20,985			20,985	20,985		
Total Wet Weight, Lb	21,300			21,300	21,145		
Adapter Weight, Lb	1,000			1,000	0		
Launch Weight, Lb	22,300			22,300	21,145		

Low Cost Payload Characteristics

Large Solar Observatory, NAS-2B

Date: 20 May 1971

Name	Current Expendable	Expendable Factor	Shuttle Factor	Low Cost Expendable	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	10/2				10/2		
Launch Volume, Ft^3	10,060				10,250	There is no low cost version of this payload. The payload is manned in both the expendable and reusable version.	
Launch Length, Ft	57				58		
Launch Diameter, Ft	15				15		
Structure/Mechanism Weight, Lb	9,681				9,681		BL
Environmental Control Weight, Lb	2,262				2,262		BL
Guidance/Navigation and Stabilization Weight, Lb	1,953				1,953		BL
Dry Propulsion Weight, Lb	0				0		-
Propellant Weight, Lb	0				0		-
Dry Attitude Control Weight, Lb	1,161				1,161		BL
Propellant Weight, Lb	2,560				1,280	Assume yearly resupply of exp.	BL
TT&C Weight, Lb	381				381		BL
Electrical Weight, Lb	1,934				1,934		BL
Mission Equipment Weight, Lb	6,875				6,875		BL
Total Dry Weight, Lb	24,247				24,247		
Total Wet Weight, Lb	26,807				25,527		
Adapter Weight, Lb	900				0		
Launch Weight, Lb	27,707				25,527		

Low Cost Payload Characteristics

Large Radio Observatory, NAS-3

Date: 24 April 1971

Name	Current Expend-able	Expend-able Factor	Shuttle Factor	Low Cost Expend-able	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	10/2			10/2	10/2		
Launch Volume, Ft^3	4,618			4,618	4,772	Low cost concept does not apply because space is not available.	
Launch Length, Ft	30			30	31		
Launch Diameter, Ft	14			14	14		
Structure/Mechanism Weight, Lb	3,000	1.0	1.0	3,000	3,000		BL
Environmental Control Weight, Lb	1,000	1.0	1.0	1,000	1,000		BL
Guidance/Navigation and Stabilization Weight, Lb	2,000	1.0	1.0	2,000	2,000		BL
Dry Propulsion Weight, Lb	0	-	-	0	0		-
Propellant Weight, Lb	0	-	-	0	0		-
Dry Attitude Control Weight, Lb	300	1.0	1.0	300	300		BL
Propellant Weight, Lb	700	1.0	1.0	700	350	Assume yearly resupply of exp.	BL
TT&C Weight, Lb	700	1.0	1.0	700	700		BL
Electrical Weight, Lb	1,600	1.0	1.0	1,600	1,600		BL
Mission Equipment Weight, Lb	10,000	1.0	1.0	10,000	10,000		BL
Total Dry Weight, Lb	18,600			18,600	18,600		
Total Wet Weight, Lb	19,300			19,300	18,950		
Adapter Weight, Lb	700			700	0		
Launch Weight, Lb	20,000			20,000	18,950		

Low Cost Payload Characteristics

High Energy Astronomy Observation Satellite, NAS-4 Date: 24 April 1971

Name	Current Expend-able	Expend-able Factor	Shuttle Factor	Low Cost Expend-able	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	10/2			10/2	10/2		
Launch Volume, Ft^3	4,752			4,752	4,850	Low Cost Concept Does Not Apply Because Space is not Available	
Launch Length, Ft	50			50	51		
Launch Diameter, Ft	11			11	11		
Structure/Mechanism Weight, Lb	3,000	1.0	1.0	3,000	3,000		BL
Environmental Control Weight, Lb	500	1.0	1.0	500	500		BL
Guidance/Navigation and Stabilization Weight, Lb	1,500	1.0	1.0	1,500	1,500		BL
Dry Propulsion Weight, Lb	0	---	---	0	0		--
Propellant Weight, Lb	0	---	---	0	0		--
Dry Attitude Control Weight, Lb	300	1.0	1.0	300	300		BL
Propellant Weight, Lb	700	1.0	1.0	700	350*	* Assume Yearly Resupply of Experiment	BL
TT&C Weight, Lb	700	1.0	1.0	700	700		BL
Electrical Weight, Lb	1,780	1.0	1.0	1,780	1,780		BL
Mission Equipment Weight, Lb	12,270	1.0	1.0	12,270	12,270		BL
Total Dry Weight, Lb	20,050			20,050	20,050		
Total Wet Weight, Lb	20,750			20,750	20,400		
Adapter Weight, Lb	700			700	0		
Launch Weight, Lb	21,450			21,450	20,400		

Low Cost Payload Characteristics

Solar Orbit Pair - A, NAS-7

Date: 7 June 1971

Name	Current Expend-able	Expend-able Factor	Shuttle Factor	Low Cost Expend-able	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	10/5			10/2	10/2		
Launch Volume, Ft^3	942		4.0	942	1,020	Use current exp. volume since low cost volume is less.	
Launch Length, Ft	12			12	13		
Launch Diameter, Ft	10			10	10		
Structure/Mechanism Weight, Lb	300	0.49	0.63	1,070	1,380	Structural weight factor	OAO
Environmental Control Weight, Lb	50	~1	~1	50	50	Volume Ratio - Passive	OAO
Guidance/Navigation and Stabilization Weight, Lb	150	1.28	1.28	192	192	3-Axis	SEO
Dry Propulsion Weight, Lb	0	-	-	0	0		-
Propellant Weight, Lb	0	-	-	0	0		-
Dry Attitude Control Weight, Lb	60	6.62	6.62	398	398	Similar requirements as SEO	SEO
Propellant Weight, Lb	140	~1.8	~2.0	100	112	Factored by total weight and MMD	SEO
TT&C Weight, Lb	150	1.28	1.16	192	174		SEO
Electrical Weight, Lb	220	1.81	1.81	400	400	Oriented array	SEO
Mission Equipment Weight, Lb	750	1.15	1.15	862	862	Sensors unlike OAO or SEO	BL
Total Dry Weight, Lb	1,680			3,164	3,456		
Total Wet Weight, Lb	1,820	1.8	2.0	3,264	3,568		
Adapter Weight, Lb	60			116	0		
Launch Weight, Lb	1,880			3,380	3,568		

Low Cost Payload Characteristics

Solar Orbit Pair - B, NAS-8

Date: 24 April 1971

Name	Current Expendable	Expendable Factor	Shuttle Factor	Low Cost Expendable	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	10/5			10/2	10/2		
Launch Volume, Ft^3	942		~3.0	1,616	1,711	Satellite Density Relationship	
Launch Length, Ft	12			17	18		
Launch Diameter, Ft	10			11	11		
Structure/Mechanism Weight, Lb	350	0.45	0.58	1,530	1,950	Structural Weight Factor	OAO
Environmental Control Weight, Lb	50	~2	~2	100	100	Volume Ratio - Passive	OAO
Guidance/Navigation and Stabilization Weight, Lb	150	1.28	1.28	192	192	3-Axis	SEO
Dry Propulsion Weight, Lb	0	-	-	0	0		-
Propellant Weight, Lb	0	-	-	0	0		-
Dry Attitude Control Weight, Lb	80	6.62	6.62	530	530	Similar requirements as SEO	SEO
Propellant Weight, Lb	160	~2	~2.2	128	140	Factored by Total Weight + MMD	SEO
TT&C Weight, Lb	150	1.28	1.16	192	174		SEO
Electrical Weight, Lb	750	1.81	1.81	1,360	1,360	Oriented Array	SEO
Mission Equipment Weight, Lb	750	1.15	1.15	862	862	Sensors unlike SEO or OAO	BL
Total Dry Weight, Lb	2,280			4,766	5,168		
Total Wet Weight, Lb	2,440	2.0	2.18	4,894	5,308		
Adapter Weight, Lb	80			166	0		
Launch Weight, Lb	2,520			5,060	5,308		

Low Cost Payload Characteristics

Optical Interferometer - A, NAS-9

Date: 23 April 1971

Name	Current Expend-able	Expend-able Factor	Shuttle Factor	Low Cost Expend-able	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	5/5			5/2	5/2		
Launch Volume, Ft^3	380		2.2	3,711	3,890	Satellite Density	
Launch Length, Ft	10			21	22		
Launch Diameter, Ft	7			15	15		
Structure/Mechanism Weight, Lb	600	.40	.505	2,260	2,840	Structural Weight Factor	OAO
Environmental Control Weight, Lb	300	~8	~8	2,400	2,400	Volume Ratio - Semi-Active	SEO
Guidance/Navigation and Stabilization Weight, Lb	500	1.28	1.28	640	640	3-Axis	SEO
Dry Propulsion Weight, Lb	0	-	-	0	0		
Propellant Weight, Lb	0	-	-	0	0		
Dry Attitude Control Weight, Lb	100	6.62	6.62	662	662	Control needs similar to SEO	SEO
Propellant Weight, Lb	200	~2.6	~2.8	208	224	Factored by total weight and MMD	SEO
TT&C Weight, Lb	250	1.28	1.16	320	290		SEO
Electrical Weight, Lb	310	1.81	1.81	560	560	Oriented Array	SEO
Mission Equipment Weight, Lb	750	1.15	1.15	862	862	Sensors unlike SEO or OAO	BL
Total Dry Weight, Lb	2,810			7,704	8,254		
Total Wet Weight, Lb	3,010	2.63	2.81	7,912	8,478		
Adapter Weight, Lb	130			308	0		
Launch Weight, Lb	3,140			8,220	8,478		

Low Cost Payload Characteristics

Optical Interferometer - B, NAS-10

Date: 23 April 1971

Name	Current Expendable	Expendable Factor	Shuttle Factor	Low Cost Expendable	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	5/5			5/2	5/2		
Launch Volume, Ft^3	380		2.2	3711	3890	Satellite Density	
Launch Length, Ft	10			21	22		
Launch Diameter, Ft	7			15	15		
Structure/Mechanism Weight, Lb	600	0.40	0.505	2260	2840	Structural Weight Factor	OAO
Environmental Control Weight, Lb	300	~8.0	~8.0	2400	2400	Volume Ratio - Semi Active	SEO
Guidance/Navigation and Stabilization Weight, Lb	500	1.28	1.28	640	640	3-Axis	SEO
Dry Propulsion Weight, Lb	0	---	---	0	0		---
Propellant Weight, Lb	0	---	---	0	0		---
Dry Attitude Control Weight, Lb	100	6.62	6.62	662	662	Control Needs Similar to SEO	SEO
Propellant Weight, Lb	200	~2.6	~2.8	208	224	Factored by Total Weight and MMD	SEO
TT&C Weight, Lb	250	1.28	1.16	320	290		SEO
Electrical Weight, Lb	310	1.81	1.81	560	560	Oriented Array	SEO
Mission Equipment Weight, Lb	750	1.15	1.15	862	862	Sensors Unlike SEO or OAO	BL
Total Dry Weight, Lb	2810			7704	8254		
Total Wet Weight, Lb	3010	2.63	2.81	7912	8478		
Adapter Weight, Lb	130			308	0		
Launch Weight, Lb	3140			8220	8478		

Low Cost Payload Characteristics

Radio Interferometer, NAS-11

Date: 6 May 1971

Name	Current Expend-able	Expend-able Factor	Shuttle Factor	Low Cost Expend-able	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	3/3			3/1.5	3/1.5		
Launch Volume, Ft^3	3848		1.8	11200	11400	Satellite Density	
Launch Length, Ft	25			63.5	64.5		
Launch Diameter, Ft	14			15	15		
Structure/Mechanism Weight, Lb	2000	0.34	0.39	5050	5750	Structural Weight Factor	OAO
Environmental Control Weight, Lb	500	~3.0	~3.0	1500	1500	Volume Ratio - Passive	OAO
Guidance/Navigation and Stabilization Weight, Lb	2000	1.28	1.28	2560	2560	3-Axis	SEO
Dry Propulsion Weight, Lb	0	---	---	0	0		---
Propellant Weight, Lb	0	---	---	0	0		---
Dry Attitude Control Weight, Lb	200	6.62	6.62	1324	1324	Control Needs Similar to SEO	SEO
Propellant Weight, Lb	500	~2.0	~2.0	500	500	Factored by Total Weight and MMD	SEO
TT&C Weight, Lb	450	1.28	1.16	576	521		SEO
Electrical Weight, Lb	450	1.81	1.81	814	814	Oriented Array	SEO
Mission Equipment Weight, Lb	3900	1.94	1.93	7560	7530	OAO Factor: Approaching Optical Mirror Accuracy for SOM Antenna	OAO
Total Dry Weight, Lb	9500			19384	19999		
Total Wet Weight, Lb	10000	2.0	2.05	19884	20499		
Adapter Weight, Lb	350			706	0		
Launch Weight, Lb	10350			20590	20499		

Low Cost Payload Characteristics

Astronomy Explorer, NAS 14 (A) and (B) Date: 11 May 1971

Name	Current Expend-able	Expend-able Factor	Shuttle Factor	Low Cost Expend-able	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr	3/3			3/1.5	3/1.5	Reduce Life to Half	
Launch Volume, Ft^3	63		5.2	308	346	Satellite Density	
Launch Length, Ft	4			8	9		
Launch Diameter, Ft	4.5			7	7		
Structure/Mechanism Weight, Lb	200	0.525	0.695	525	675	Structural Factor Applied to All Subsystems Except Propulsion	SEO
Environmental Control Weight, Lb	15	~6.0	~6.0	90	90	Volume Ratio - Passive	OAO
Guidance/Navigation and Stabilization Weight, Lb	40	1.28	1.28	51	51	3-Axis	SEO
Dry Propulsion Weight, Lb	30			30	30	High Mass Fraction; $W_P = W_P' + 0.15 (\Delta W_{Prop})$	BL
Propellant Weight, Lb	80			73	82	Vacuum Velocity by Reduced MMD Ratio	BL
Dry Attitude Control Weight, Lb	14	6.62	6.62	93	93	Control Needs Similar to SEO	SEO
Propellant Weight, Lb	20	~1.9	~2.1	19	21	Ratioed by Weight and MMD	SEO
TT&C Weight, Lb	50	1.28	1.16	64	58		SEO
Electrical Weight, Lb	161	1.81	1.81	292	292	Oriented Array	SEO
Mission Equipment Weight, Lb	250	1.47	1.47	368	368	Each Flight Will Have Different Experiment But Similar to SEO	SEO
Total Dry Weight, Lb	760			1513	1657		
Total Wet Weight, Lb	860	1.87	2.05	1605	1760		
Adapter Weight, Lb	30			55	0		
Launch Weight, Lb	890			1660	1760		

Low Cost Payload Characteristics

Orbiting Solar Observation, NAS-15

Date: 23 April 1971

Name	Current Expendable	Expendable Factor	Shuttle Factor	Low Cost Expendable	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	1/1			1/1	1/1		
Launch Volume, Ft^3	380		~3.5	1217	1296	Satellite Density	
Launch Length, Ft	10			15.5	16.5		
Launch Diameter, Ft	7			10	10		
Structure/Mechanism Weight, Lb	400	0.47	0.61	1310	1690	Structural Weight Factor	OAO
Environmental Control Weight, Lb	70	~3.0	~3.0	210	210	Volume Ratio - Passive	OAO
Guidance/Navigation and Stabilization Weight, Lb	200	1.28	1.28	256	256	3-Axis	SEO
Dry Propulsion Weight, Lb	0	---	---	0	0		---
Propellant Weight, Lb	0	---	---	0	0		---
Dry Attitude Control Weight, Lb	70	4.75	4.75	332	332	Control Needs Similar to OAO	OAO
Propellant Weight, Lb	150	~2.1	2.3	315	345	Factored by Total Weight Ratio	OAO
TT&C Weight, Lb	160	1.28	1.16	205	185		SEO
Electrical Weight, Lb	350	1.42	1.36	497	476	Fixed Type Array	OAO
Mission Equipment Weight, Lb	500	1.94	1.93	970	965	Assumed to be Like OAO	OAO
Total Dry Weight, Lb	1750			3780	4114		
Total Wet Weight, Lb	1900	2.15	2.34	4095	4459		
Adapter Weight, Lb	80			175	0		
Launch Weight, Lb	1980			4270	4459		

Low Cost Payload Characteristics

Lower Magnetosphere, NSP-1

Date: 6 May 1971

Name	Current Expendable	Expendable Factor	Shuttle Factor	Low Cost Expendable	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	3/1			3/1	3/1		
Launch Volume, Ft^3	100		3.25	1355	1470	Satellite Density	
Launch Length, Ft	5			12	13		
Launch Diameter, Ft	4			12	12		
Structure/Mechanism Weight, Lb	240	0.47	0.60	1270	1770	Structural Weight Factor	SEO
Environmental Control Weight, Lb	30	~12	~12	360	360	Volume Limited to 12 - Passive	OAO
Guidance/Navigation and Stabilization Weight, Lb	80	1.28	1.28	102	102	3-Axis	SEO
Dry Propulsion Weight, Lb	0			0	0		
Propellant Weight, Lb	0			0	0		
Dry Attitude Control Weight, Lb	70	4.75	4.75	333	333	Universal Test Bed	OAO
Propellant Weight, Lb	450	~3.40	~4.00	1530	1800	Ratioed by Total Weight	OAO
TT&C Weight, Lb	100	1.28	1.16	128	116		SEO
Electrical Weight, Lb	90	1.42	1.36	128	122	Fixed Type Array	OAO
Mission Equipment Weight, Lb	100	1.15	1.15	115	115	Nothing in Common with SEO or OAO: Non Standard Equipment: Expense in Calibration and Fabrication	BL
Total Dry Weight, Lb	710			2436	2918		
Total Wet Weight, Lb	1160	3.40	4.10	3966	4718		
Adapter Weight, Lb	40			144	0		
Launch Weight, Lb	1200			4110	4718		

Low Cost Payload Characteristics
Middle Magnetosphere, NSP-2

Date: 6 May 1971

Name	Current Expend-able	Expend-able Factor	Shuttle Factor	Low Cost Expend-able	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	3/1			3/1	3/1		
Launch Volume, Ft^3	226		~4.5	540	604	Satellite Density	
Launch Length, Ft	8			8.5	9.5		
Launch Diameter, Ft	6			9	9		
Structure/Mechanism Weight, Lb	215	0.51	0.685	780	1095	Structural Weight Factor	SEO
Environmental Control Weight, Lb	30	~2.50	~2.50	75	75	Volume Ratio - Passive	OAO
Guidance/Navigation and Stabilization Weight, Lb	70	1.15	1.15	80	80	Spin - Use Baseline with Contingency	BL
Dry Propulsion Weight, Lb	0			0	0		---
Propellant Weight, Lb	0			0	0		---
Dry Attitude Control Weight, Lb	60	4.75	4.75	285	285	Universal Test Bed	OAO
Propellant Weight, Lb	300	~2.40	~2.70	720	810	Ratioed by Total Weight	OAO
TT&C Weight, Lb	100	1.28	1.16	128	116		SEO
Electrical Weight, Lb	90	1.42	1.36	128	122	Fixed Type Array	OAO
Mission Equipment Weight, Lb	100	1.15	1.15	115	115	Not Like SEO or OAO: Standard Equipments. Available Equipments	BL
Total Dry Weight, Lb	665			1591	1888		
Total Wet Weight, Lb	965	2.40	2.80	2311	2698		
Adapter Weight, Lb	35			89	0		
Launch Weight, Lb	1000			2400	2698		

Low Cost Payload Characteristics

Upper Magnetosphere, NSP-3

Date: 10 May 1971

Name	Current Expend-able	Expend-able Factor	Shuttle Factor	Low Cost Expend-able	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	3/1			3/1	3/1		
Launch Volume, Ft^3	75		~5.30	212	240	Satellite Density	
Launch Length, Ft	6			7.5	8.5		
Launch Diameter, Ft	4			6	6		
Structure/Mechanism Weight, Lb	120	0.54	0.71	406	530	Structural Weight Factor	SEO
Environmental Control Weight, Lb	20	~3.00	~3.00	60	60	Volume Ratio - Passive	OAO
Guidance/Navigation and Stabilization Weight, Lb	30	1.15	1.15	35	35	Spin - Use Baseline with Contingency	BL
Dry Propulsion Weight, Lb	0	---	---	0	0		---
Propellant Weight, Lb	0	---	---	0	0		---
Dry Attitude Control Weight, Lb	30	4.75	4.75	143	143	Universal Test Bed	OAO
Propellant Weight, Lb	60	~1.80	~2.00	108	120	Ratioed by Total Weight	OAO
TT&C Weight, Lb	70	1.28	1.16	90	81		SEO
Electrical Weight, Lb	100	1.42	1.36	142	136	Fixed Type Array	OAO
Mission Equipment Weight, Lb	150	1.15	1.15	173	173	Standard Sensors; Low Cost Experiments	BL
Total Dry Weight, Lb	520			1049	1158		
Total Wet Weight, Lb	580	2.00	2.20	1157	1278		
Adapter Weight, Lb	20			43	0		
Launch Weight, Lb	600			1200	1278		

Low Cost Payload Characteristics

General Relativity, NSP-6

Date: 10 May 1971

Name	Current Expend-able	Expend-able Factor	Shuttle Factor	Low Cost Expend-able	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	1/1			1/1	1/1		
Launch Volume, Ft^3	137		~3.90	863	943	Satellite Density	
Launch Length, Ft	7			11	12		
Launch Diameter, Ft	5			10	10		
Structure/Mechanism Weight, Lb	200	0.485	0.625	1130	1440	Structural Weight Factor	OAO
Environmental Control Weight, Lb	50	~7.0	~7.0	350	350	Factored by Volume - Passive	OAO
Guidance/Navigation and Stabilization Weight, Lb	150	1.28	1.28	192	192	3-Axis	SEO
Dry Propulsion Weight, Lb	0	---	---	0	0		---
Propellant Weight, Lb	0	---	---	0	0		---
Dry Attitude Control Weight, Lb	20	4.75	4.75	95	95	Control Needs Similar to OAO	OAO
Propellant Weight, Lb	80	~2.30	~2.50	184	200	Ratioed by Weight	OAO
TT&C Weight, Lb	120	1.28	1.16	154	139		SEO
Electrical Weight, Lb	480	1.42	1.36	681	652	Fixed Type Array	OAO
Mission Equipment Weight, Lb	350	1.94	1.93	680	675	Costly like OAO	OAO
Total Dry Weight, Lb	1370			3282	3543		
Total Wet Weight, Lb	1450	2.39	2.58	3466	3743		
Adapter Weight, Lb	50			124	0		
Launch Weight, Lb	1500			3590	3743		

Low Cost Payload Characteristics

General Relativity, NSP-7

Date: 10 May 1971

Name	Current Expend-able	Expend-able Factor	Shuttle Factor	Low Cost Expend-able	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	1/1			1/1	1/1		
Launch Volume, Ft^3	63		~5.50	227	254	Satellite Density	
Launch Length, Ft	5			8	9		
Launch Diameter, Ft	4			6	6		
Structure/Mechanism Weight, Lb	70	0.37	0.72	300	585	Structural Weight Factor	OAO
Environmental Control Weight, Lb	10	~4.0	~4.0	40	40	Factored by Volume Ratio - Passive	OAO
Guidance/Navigation and Stabilization Weight, Lb	25	1.28	1.28	32	36	3-Axis	SEO
Dry Propulsion Weight, Lb	0	---	---	---	---		---
Propellant Weight, Lb	0	---	---	---	---		---
Dry Attitude Control Weight, Lb	30	4.75	4.75	142	142	Control Needs Similar to OAO	OAO
Propellant Weight, Lb	50	~2.30	~2.70	115	135	Factored by Total Weight	OAO
TT&C Weight, Lb	60	1.28	1.16	77	70		SEO
Electrical Weight, Lb	120	1.42	1.36	170	163	Fixed Type Array	OAO
Mission Equipment Weight, Lb	120	1.94	1.93	233	231	Costly Like OAO	OAO
Total Dry Weight, Lb	435			994	1263		
Total Wet Weight, Lb	485	2.28	2.88	1109	1398		
Adapter Weight, Lb	15			31	0		
Launch Weight, Lb	500			1140	1398		

Low Cost Payload Characteristics

Polar Earth Observation Satellite, NEO-2

Date: 10 May 1971

Name	Current Expendable	Expendable Factor	Shuttle Factor	Low Cost Expendable	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	2/2			2/2	2/2		
Launch Volume, Ft^3	1700		2.75	2060	2190	Satellite Density	
Launch Length, Ft	15			15.5	16.5		
Launch Diameter, Ft	12			13	13		
Structure/Mechanism Weight, Lb	370	0.445	0.565	1680	2160	Structural Weight Factor	SEO
Environmental Control Weight, Lb	60	~1.5	~1.5	90	90	Volume Ratio - Semi Active	SEO
Guidance/Navigation and Stabilization Weight, Lb	200	1.28	1.28	256	256	3-Axis	SEO
Dry Propulsion Weight, Lb	0	---	---	0	0		---
Propellant Weight, Lb	0	---	---	0	0		---
Dry Attitude Control Weight, Lb	80	6.62	6.62	530	530	Like SEO	SEO
Propellant Weight, Lb	160	~2.1	~2.5	336	400	Factored by Total Weight	SEO
TT&C Weight, Lb	180	1.28	1.16	230	209		SEO
Electrical Weight, Lb	600	1.81	1.81	1085	1085	Oriented Array	SEO
Mission Equipment Weight, Lb	850	1.47	1.47	1250	1250	Experiment Similar to SEO	SEO
Total Dry Weight, Lb	2340			5121	5580		
Total Wet Weight, Lb	2500	2.18	2.40	5457	5980		
Adapter Weight, Lb	90			223	0		
Launch Weight, Lb	2590			5680	5980		

Low Cost Payload Characteristics

Synchronous Earth Observation Satellite, NEO-3 — Date: 24 April 1971

Name	Current Expend-able	Expend-able Factor	Shuttle Factor	Low Cost Expend-able	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	2/2			2/2	2/2		
Launch Volume, Ft^3	75		4.20	604	668	Satellite Density	
Launch Length, Ft	6			9.5	10.5		
Launch Diameter, Ft	4			9	9		
Structure/Mechanism Weight, Lb	150	0.48	0.66	853	1130	Structural Weight Factor	SEO
Environmental Control Weight, Lb	20	~ 8.0	~8.0	160	160	Volume Ratio - Semi-active	SEO
Guidance/Navigation and Stabilization Weight, Lb	65	1.28	1.28	83	83	3-Axis	SEO
Dry Propulsion Weight, Lb	0	---	---	0	0		---
Propellant Weight, Lb	0	---	---	0	0		---
Dry Attitude Control Weight, Lb	40	6.62	6.62	265	265	Similar to SEO	SEO
Propellant Weight, Lb	80	~2.50	~2.70	200	216	Factored by Weight	SEO
TT&C Weight, Lb	95	1.28	1.16	121	110		SEO
Electrical Weight, Lb	200	1.81	1.81	362	362	Oriented Array	SEO
Mission Equipment Weight, Lb	350	1.47	1.47	515	515	Experiment Similar to SEO	SEO
Total Dry Weight, Lb	920			2359	2625		
Total Wet Weight, Lb	1000	2.55	2.84	2559	2841		
Adapter Weight, Lb	30			111	0		
Launch Weight, Lb	1030			2670	2841		

Low Cost Payload Characteristics

Synchronous ERS, NEO-4

Date: 10 May 1971

Name	Current Expend-able	Expend-able Factor	Shuttle Factor	Low Cost Expend-able	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	2/2			2/2	2/2		
Launch Volume, Ft^3	75		4.40	603	660	Satellite Density	
Launch Length, Ft	6			9.5	10.5		
Launch Diameter, Ft	4			9	9		
Structure/Mechanism Weight, Lb	150	0.50	0.655	879	1142	Structural Weight Factor	SEO
Environmental Control Weight, Lb	20	~9.0	~9.0	180	180	Volume Ratio - Active	SEO
Guidance/Navigation and Stabilization Weight, Lb	65	1.28	1.28	83	83	3-Axis	SEO
Dry Propulsion Weight, Lb	0	---	---	0	0		---
Propellant Weight, Lb	0	---	---	0	0		---
Dry Attitude Control Weight, Lb	40	6.62	6.62	208	265	Similar to SEO	SEO
Propellant Weight, Lb	80	~2.6	~2.9	288	232	Factored by Weight	SEO
TT&C Weight, Lb	95	1.28	1.16	121	110		SEO
Electrical Weight, Lb	200	1.81	1.81	362	362	Oriented Array	SEO
Mission Equipment Weight, Lb	350	1.47	1.47	515	515	Experiment Similar to SEO	SEO
Total Dry Weight, Lb	920			2348	2657		
Total Wet Weight, Lb	1000	2.64	2.89	2636	2889		
Adapter Weight, Lb	30			104	0		
Launch Weight, Lb	1030			2740	2889		

Low Cost Payload Characteristics

Earth Physics Satellite, NEO-5

Date: 10 May 1971

Name	Current Expend-able	Expend-able Factor	Shuttle Factor	Low Cost Expend-able	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	2/2			2/2	2/2		
Launch Volume, Ft^3	62		5.20	308	346	Satellite Density	
Launch Length, Ft	6.5			8	9		
Launch Diameter, Ft	3.5			7	7		
Structure/Mechanism Weight, Lb	80	0.525	0.69	542	719	Structural Weight Factor	SEO
Environmental Control Weight, Lb	10	~5.0	~5.0	50	50	Volume Ratio - Semi-Active	SEO
Guidance/Navigation and Stabilization Weight, Lb	30	1.28	1.28	38	38	3-Axis	SEO
Dry Propulsion Weight, Lb	0	---	---	0	0		---
Propellant Weight, Lb	0	---	---	0	0		---
Dry Attitude Control Weight, Lb	30	6.62	6.62	200	200	Control Needs Like SEO	SEO
Propellant Weight, Lb	50	~2.7	~3.0	135	150	Weight Ratio	SEO
TT&C Weight, Lb	60	1.28	1.16	77	70		SEO
Electrical Weight, Lb	170	1.81	1.81	308	308	Oriented Array	SEO
Mission Equipment Weight, Lb	150	1.15	1.15	225	225	Vidicon Only Common With SEO; All Others Different	BL
Total Dry Weight, Lb	530			1440	1610		
Total Wet Weight, Lb	580	2.71	3.03	1575	1760		
Adapter Weight, Lb	20			55	0		
Launch Weight, Lb	600			1630	1760		

Low Cost Payload Characteristics

Tiros, NEO-6

Date: 10 May 1971

Name	Current Expend-able	Expend-able Factor	Shuttle Factor	Low Cost Expend-able	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	5/5			5/2	5/2		
Launch Volume, Ft^3	196		~4.9	402	452	Satellite Density	
Launch Length, Ft	10			8	9		
Launch Diameter, Ft	5			8	8		
Structure/Mechanism Weight, Lb	200	0.52	0.68	665	866	Structural Weight Factor	SEO
Environmental Control Weight, Lb	20	~2.5	~2.5	50	50	Volume Ratio - Active	SEO
Guidance/Navigation and Stabilization Weight, Lb	65	1.28	1.28	83	83	3-Axis	SEO
Dry Propulsion Weight, Lb	0	---	---	0	0		---
Propellant Weight, Lb	0	---	---	0	0		---
Dry Attitude Control Weight, Lb	30	6.62	6.62	200	200	Like SEO	SEO
Propellant Weight, Lb	80	~1.8	~2.0	58	64	Weight and MMD Ratio	SEO
TT&C Weight, Lb	90	1.28	1.16	115	104	Two Year Life Limit	SEO
Electrical Weight, Lb	270	1.81	1.81	489	489	Oriented Array	SEO
Mission Equipment Weight, Lb	245	1.15	1.15	282	282	More Equipment Than SEO. Tiros More Complex; Scanning Capability; High Resolution Radiometer	BL
Total Dry Weight, Lb	920			1884	2074		
Total Wet Weight, Lb	1000	1.94	2.14	1942	2138		
Adapter Weight, Lb	30			78	0		
Launch Weight, Lb	1030			2020	2138		

Low Cost Payload Characteristics

TOS Meterological Satellite, NEO-7

Date: 10 May 1971

Name	Current Expend-able	Expend-able Factor	Shuttle Factor	Low Cost Expend-able	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	12/4			12/2	12/2		
Launch Volume, Ft^3	118		~4.8	428	478	Satellite Density	
Launch Length, Ft	6			8.5	9.5		
Launch Diameter, Ft	5			8	8		
Structure/Mechanism Weight, Lb	200	0.515	0.675	707	930	Structural Weight Factor	SEO
Environmental Control Weight, Lb	20	~2.5	~2.5	50	50	Volume Factor - Active	SEO
Guidance/Navigation and Stabilization Weight, Lb	60	1.28	1.28	77	77	3-Axis	SEO
Dry Propulsion Weight, Lb	0	---	---	0	0		---
Propellant Weight, Lb	0	---	---	0	0		---
Dry Attitude Control Weight, Lb	30	6.62	6.62	200	200	Similar to SEO	SEO
Propellant Weight, Lb	80	~1.9	~2.2	76	88	Ratioed by Weight and MMD	SEO
TT&C Weight, Lb	90	1.28	1.16	115	104	Two Year Life Limit	SEO
Electrical Weight, Lb	270	1.81	1.81	488	488	Oriented Array	SEO
Mission Equipment Weight, Lb	250	1.47	1.47	368	368	Similar to SEO but at Low Altitude & Sun Synchronous	SEO
Total Dry Weight, Lb	920			2005	2217		
Total Wet Weight, Lb	1000	2.08	2.31	2081	2305		
Adapter Weight, Lb	30			69	0		
Launch Weight, Lb	1030			2150	2305		

Low Cost Payload Characteristics

Synchronous Meteorological Satellite, NEO-8 — Date: 10 May 1971

Name	Current Expendable	Expendable Factor	Shuttle Factor	Low Cost Expendable	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	2/2			2/2	2/2		
Launch Volume, Ft^3	157		4.3	604	667	Satellite Density	
Launch Length, Ft	8			9.5	10.5		
Launch Diameter, Ft	5			9	9		
Structure/Mechanism Weight, Lb	160	0.50	0.655	861	1143	Structural Weight Factor	SEO
Environmental Control Weight, Lb	30	~4.0	~4.0	120	120	Volume Factor - Active	SEO
Guidance/Navigation and Stabilization Weight, Lb	70	1.28	1.28	90	90	3-Axis	SEO
Dry Propulsion Weight, Lb	0	---	---	0	0		---
Propellant Weight, Lb	0	---	---	0	0		---
Dry Attitude Control Weight, Lb	50	6.62	6.62	331	331	Like SEO	SEO
Propellant Weight, Lb	90	~2.6	~3.0	234	270	Weight Ratio	SEO
TT&C Weight, Lb	100	1.28	1.16	128	116		SEO
Electrical Weight, Lb	250	1.81	1.81	451	451	Oriented Array	SEO
Mission Equipment Weight, Lb	250	1.47	1.47	368	368	Similar to SEO	SEO
Total Dry Weight, Lb	910			2349	2619		
Total Wet Weight, Lb	1000	2.58	2.89	2583	2889		
Adapter Weight, Lb	35			87	0		
Launch Weight, Lb	1035			2670	2889		

Low Cost Payload Characteristics

Synchronous Earth Resources, NEO-11 Date: 10 May 1971

Name	Current Expendable	Expendable Factor	Shuttle Factor	Low Cost Expendable	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	6/3			6/2	6/2		
Launch Volume, Ft^3	170		~4.6	503	552	Satellite Density	
Launch Length, Ft	6			10	11		
Launch Diameter, Ft	6			8	8		
Structure/Mechanism Weight, Lb	150	0.51	0.67	778	1022	Structural Weight Factor	SEO
Environmental Control Weight, Lb	20	~3.0	~3.0	60	60	Use Volume Ratio - Active	SEO
Guidance/Navigation and Stabilization Weight, Lb	65	1.28	1.28	83	83	3-Axis	SEO
Dry Propulsion Weight, Lb	0	---	---	0	0		---
Propellant Weight, Lb	0	---	---	0	0		---
Dry Attitude Control Weight, Lb	40	6.62	6.62	265	265	Similar to SEO	SEO
Propellant Weight, Lb	80	~2.2	~2.5	117	133	Factored by Weight and MMD	SEO
TT&C Weight, Lb	95	1.28	1.16	121	110	Two Year Life Limit	SEO
Electrical Weight, Lb	200	1.81	1.81	362	362	Oriented Array	SEO
Mission Equipment Weight, Lb	350	1.47	1.47	515	515	Similar to SEO	SEO
Total Dry Weight, Lb	920			2184	2417		
Total Wet Weight, Lb	1000	2.30	2.55	2301	2550		
Adapter Weight, Lb	30			79	0		
Launch Weight, Lb	1030			2380	2550		

Low Cost Payload Characteristics

Synchronous Meteorological Satellite, NEO-15

Date: 10 May 1971

Name	Current Expend-able	Expend-able Factor	Shuttle Factor	Low Cost Expend-able	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	12/2			12/2	12/2		
Launch Volume, Ft^3	157		4.4	604	668	Satellite Density	
Launch Length, Ft	8			9.5	10.5		
Launch Diameter, Ft	5			9	9		
Structure/Mechanism Weight, Lb	160	0.50	0.66	866	1172	Structural Weight Factor	SEO
Environmental Control Weight, Lb	30	~4.0	~4.0	120	120	Volume Ratio - Active	SEO
Guidance/Navigation and Stabilization Weight, Lb	70	1.28	1.28	90	90	3-Axis	SEO
Dry Propulsion Weight, Lb	0	---	---	0	0		---
Propellant Weight, Lb	0	---	---	0	0		---
Dry Attitude Control Weight, Lb	50	6.62	6.62	331	331	Similar to SEO	SEO
Propellant Weight, Lb	90	~2.7	~3.0	243	270	Weight Ratio	SEO
TT&C Weight, Lb	100	1.28	1.16	128	116		SEO
Electrical Weight, Lb	250	1.81	1.81	451	451	Oriented Array	SEO
Mission Equipment Weight, Lb	250	1.47	1.47	368	368	Similar to SEO	SEO
Total Dry Weight, Lb	910			2354	2648		
Total Wet Weight, Lb	1000	2.60	2.92	2597	2918		
Adapter Weight, Lb	35			83	0		
Launch Weight, Lb	1035			2680	2918		

Low Cost Payload Characteristics

Polar Earth Resources, NEO-16

Date: 10 May 1971

Name	Current Expendable	Expendable Factor	Shuttle Factor	Low Cost Expendable	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	12/2			12/2	12/2		
Launch Volume, Ft^3	340		2.6	2310	2460	Satellite Density	
Launch Length, Ft	12			15	16		
Launch Diameter, Ft	6			14	14		
Structure/Mechanism Weight, Lb	370	0.435	0.56	1765	2290	Structural Weight Factor	SEO
Environmental Control Weight, Lb	60	~6.0	~6.0	360	360	Volume Factor - Active	SEO
Guidance/Navigation and Stabilization Weight, Lb	200	1.28	1.28	256	256	3-Axis	SEO
Dry Propulsion Weight, Lb	0	---	---	0	0		---
Propellant Weight, Lb	0	---	---	0	0		---
Dry Attitude Control Weight, Lb	80	6.62	6.62	530	530	Needs Like SEO	SEO
Propellant Weight, Lb	160	~2.2	~2.5	352	400	Weight Ratio	SEO
TT&C Weight, Lb	180	1.28	1.16	230	209		SEO
Electrical Weight, Lb	600	1.81	1.81	1085	1085	Oriented Array	SEO
Mission Equipment Weight, Lb	850	1.47	1.47	1250	1250	High Resolution imaging, Similar to SEO, More Expensive Camera System	SEO
Total Dry Weight, Lb	2340			5476	5980		
Total Wet Weight, Lb	2500	2.33	2.55	5828	6380		
Adapter Weight, Lb	90			222	0		
Launch Weight, Lb	2590			6050	6380		

Low Cost Payload Characteristics

Polar Earth Resources Satellite, NEO-17

Date: 25 April 1971

Name	Current Expend-able	Expend-able Factor	Shuttle Factor	Low Cost Expend-able	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	2/2			2/2	2/2		
Launch Volume, Ft^3	1700		~2.75	2000	2160	Satellite Density	
Launch Length, Ft	15			13	14		
Launch Diameter, Ft	12			14	14		
Structure/Mechanism Weight, Lb	370	0.44	0.56	1670	2140	Structural Weight Factor	SEO
Environmental Control Weight, Lb	60	~1.5	~1.5	90	90	Volume Factor - Active	SEO
Guidance/Navigation and Stabilization Weight, Lb	200	1.28	1.28	256	256	3-Axis	SEO
Dry Propulsion Weight, Lb	0	---	---	0	0		---
Propellant Weight, Lb	0	---	---	0	0		---
Dry Attitude Control Weight, Lb	80	6.62	6.62	530	530	Needs Similar to SEO	SEO
Propellant Weight, Lb	160	~2.2	~2.5	352	400	Weight Factor	SEO
TT&C Weight, Lb	180	1.28	1.16	230	209		SEO
Electrical Weight, Lb	600	1.81	1.81	1085	1085	Oriented Array	SEO
Mission Equipment Weight, Lb	850	1.47	1.47	1250	1250	Experiment Similar to SEO	SEO
Total Dry Weight, Lb	2340			5111	5560		
Total Wet Weight, Lb	2500	2.18	2.39	5463	5960		
Adapter Weight, Lb	90			217	0		
Launch Weight, Lb	2590			5680	5960		

Low Cost Payload Characteristics
Application Technology Satellite, NCN-1

Date: 6 May 1971

Name	Current Expendable	Expendable Factor	Shuttle Factor	Low Cost Expendable	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	5/5			5/2	5/2		
Launch Volume, Ft^3	3711		~1.8	8310	8490	Non Com. Density Used Since G&N is 3-Axis	
Launch Length, Ft	21			47	48		
Launch Diameter, Ft	15			15	15		
Structure/Mechanism Weight, Lb	1200	0.355	0.42	3820	4510	Structural Weight Factor	SEO
Environmental Control Weight, Lb	300	~2.0	~2.0	600	600	Volume Ratio - Passive	OAO
Guidance/Navigation and Stabilization Weight, Lb	1000	1.28	1.28	1280	1250	3-Axis	SEO
Dry Propulsion Weight, Lb	0	---	---	0	0		---
Propellant Weight, Lb	0	---	---	0	0		---
Dry Attitude Control Weight, Lb	150	6.62	6.62	992	992	Similar to SEO	SEO
Propellant Weight, Lb	400	~1.7	~1.9	272	304	Factor by Weight and MMD	SEO
TT&C Weight, Lb	400	1.28	1.16	512	464		SEO
Electrical Weight, Lb	2900	1.81	1.81	5250	5250	Oriented Array	SEO
Mission Equipment Weight, Lb	1600	1.15	1.15	1840	1840	Mostly Communications & Navigation Type Experiment; Some Met. Sat. and Earth Res.	BL
Total Dry Weight, Lb	7550			14294	14936		
Total Wet Weight, Lb	7950	1.83	1.92	14566	15240		
Adapter Weight, Lb	280			534	0		
Launch Weight, Lb	8230			15100	15240		

Low Cost Payload Characteristics

Small Applications Technology Satellite, NCN-2 (A) & (B) Date: 2 June 1971

Name	Current Expend-able	Expend-able Factor	Shuttle Factor	Low Cost Expend-able	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	1/1			1/1	1/1		
Launch Volume, Ft^3	398			398	431	Current Volume Used Since Low Cost Volume is Less	
Launch Length, Ft	12			12	13		
Launch Diameter, Ft	6.5			6.5	6.5		
Structure/Mechanism Weight, Lb	115	0.54	0.71	409	535	Structural Weight Factor	SEO
Environmental Control Weight, Lb	10	~1.0	~1.0	10	10	Volume Ratio - Passive	OAO
Guidance/Navigation and Stabilization Weight, Lb	25	1.28	1.28	32	32	3-Axis	SEO
Dry Propulsion Weight, Lb	0	---	---	0	0		---
Propellant Weight, Lb	0	---	---	0	0		---
Dry Attitude Control Weight, Lb	30	4.75	4.75	143	143	Universal Test Bed	OAO
Propellant Weight, Lb	60	~1.8	~2.0	108	120	Factored by Total Weight Ratio	OAO
TT&C Weight, Lb	60	1.28	1.16	77	70		SEO
Electrical Weight, Lb	150	1.42	1.36	213	204	Fixed Array	OAO
Mission Equipment Weight, Lb	150	1.15	1.15	173	173	Low Cost Satellites, Similar to Middle Magnet. - Not Like SEO or OAO	BL
Total Dry Weight, Lb	540			1057	1167		
Total Wet Weight, Lb	600	1.94	2.14	1165	1287		
Adapter Weight, Lb	20			39	0		
Launch Weight, Lb	620			1204	1287		

Low Cost Payload Characteristics

Cooperative Applications Satellite, NCN-3 (A) & (B) Date: 2 June 1971

Name	Current Expendable	Expendable Factor	Shuttle Factor	Low Cost Expendable	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	2/2			2/2	2/2		
Launch Volume, Ft^3	398			398	431	Current Expendable Used Since Low Cost Volume is Less	
Launch Length, Ft	12			12	13		
Launch Diameter, Ft	6.5			6.5	6.5		
Structure/Mechanism Weight, Lb	120	0.525	0.685	624	820	Structural Weight Factor	SEO
Environmental Control Weight, Lb	20	~1.0	~1.0	20	20	Volume Ratio - Passive	OAO
Guidance/Navigation and Stabilization Weight, Lb	50	1.28	1.28	64	64	3-Axis	SEO
Dry Propulsion Weight, Lb	0	---	---	0	0		---
Propellant Weight, Lb	0	---	---	0	0		---
Dry Attitude Control Weight, Lb	30	6.62	6.62	198	198	Similar to SEO	SEO
Propellant Weight, Lb	70	~2.2	~2.5	154	175	Ratioed by Total Weight	SEO
TT&C Weight, Lb	80	1.28	1.16	102	93		SEO
Electrical Weight, Lb	200	1.81	1.81	362	362	Oriented Array	SEO
Mission Equipment Weight, Lb	250.	1.15	1.15	288	288	Vidicon; All Different Experiments, Primarily Communications & Navigation; Primarily Standard Sensors	BL
Total Dry Weight, Lb	750			1658	1845		
Total Wet Weight, Lb	820	2.21	2.46	1812	2020		
Adapter Weight, Lb	30			66	0		
Launch Weight, Lb	850			1878	2020		

Low Cost Payload Characteristics

Tracking and Data Relay Satellite, NCN-5

Date: 11 May 1971

Name	Current Expend-able	Expend-able Factor	Shuttle Factor	Low Cost Expend-able	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	12/3			12/3	12/3	Three Year Life Since TT&C Uses Mission Sensors	
Launch Volume, Ft^3	1335		1.2	3980	4160	Use Com. Sat. Density	
Launch Length, Ft	17			22.5	23.5		
Launch Diameter, Ft	10			15	15		
Structure/Mechanism Weight, Lb	480	0.46	0.59	1430	1850	Structural Weight Factor	SEO
Environmental Control Weight, Lb	60	~3.2	~3.2	192	192	Volume Ratio - Passive	OAO
Guidance/Navigation and Stabilization Weight, Lb	110	1.15	1.15	127	127	Spinner	BL
Dry Propulsion Weight, Lb	0	---	---	0	0		---
Propellant Weight, Lb	0	---	---	0	0		---
Dry Attitude Control Weight, Lb	80	6.62	6.62	535	535	Similar to SEO	SEO
Propellant Weight, Lb	320	~2.0	~2.2	640	705	Factored by Weight	SEO
TT&C Weight, Lb	0	---	---	0	0		---
Electrical Weight, Lb	650	1.42	1.36	924	884	Fixed Array	OAO
Mission Equipment Weight, Lb	600	1.15	1.15	690	690	Communication Sensors	BL
Total Dry Weight, Lb	1980			3898	4278		
Total Wet Weight, Lb	2300	1.97	2.16	4538	4983		
Adapter Weight, Lb	80			157	0		
Launch Weight, Lb	2380			4695	4983		

Low Cost Payload Characteristics

Comsat Satellites, NCN-7

Date: 10 May 1971

Name	Current Expend-able	Expend-able Factor	Shuttle Factor	Low Cost Expend-able	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	12/5			12/2	12/2		
Launch Volume, Ft^3	1400		~1.7	1570	1640	Com. Sat. Density	
Launch Length, Ft	22			20	21		
Launch Diameter, Ft	9			10	10		
Structure/Mechanism Weight, Lb	236	0.505	0.66	840	1110	Structural Weight Factor	SEO
Environmental Control Weight, Lb	65	~1.2	~1.2	78	78	Volume Ratio - Passive	OAO
Guidance/Navigation and Stabilization Weight, Lb	71	1.15	1.15	82	82	Spinner	BL
Dry Propulsion Weight, Lb	0	---	---	0	0		---
Propellant Weight, Lb	0	---	---	0	0		---
Dry Attitude Control Weight, Lb	61	6.62	6.62	405	405	Similar to SEO	SEO
Propellant Weight, Lb	273	~1.7	~2.0	186	218	Ratioed to Weight and MMD	SEO
TT&C Weight, Lb	51	1.28	1.16	65	60		SEO
Electrical Weight, Lb	307	1.42	1.36	436	418	Fixed Array	OAO
Mission Equipment Weight, Lb	355	1.15	1.15	408	408	Comm. Sat.	BL
Total Dry Weight, Lb	1146			2314	2561		
Total Wet Weight, Lb	1420	1.775	1.97	2500	2779		
Adapter Weight, Lb	70			100	0		
Launch Weight, Lb	1490			2600	2779		

Low Cost Payload Characteristics

U. S. Domestic Communications Satellite, NCN-8 Date: 10 May 1971

Name	Current Expendable	Expendable Factor	Shuttle Factor	Low Cost Expendable	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	12/7			12/2	12/2		
Launch Volume, Ft^3	4418		~1.15	4680	4860	Com. Satellite Density	
Launch Length, Ft	25			26.5	27.5		
Launch Diameter, Ft	15			15	15		
Structure/Mechanism Weight, Lb	700	0.45	0.57	1625	2035	Structural Weight Factor	SEO
Environmental Control Weight, Lb	125	~1.1	~1.1	137	137	Volume Ratio - Passive	OAO
Guidance/Navigation and Stabilization Weight, Lb	150	1.15	1.15	173	173	Spinner	BL
Dry Propulsion Weight, Lb	0	---	---	0	0		---
Propellant Weight, Lb	0	---	---	0	0		---
Dry Attitude Control Weight, Lb	100	6.62	6.62	662	662	Like SEO	SEO
Propellant Weight, Lb	400	~1.4	~1.5	160	171	Weight and MMD Factor	SEO
TT&C Weight, Lb	100	1.28	1.16	128	116		SEO
Electrical Weight, Lb	850	1.42	1.36	1210	1158	Fixed Type Array	OAO
Mission Equipment Weight, Lb	1000	1.15	1.15	1150	1150	Communication	BL
Total Dry Weight, Lb	3025			5085	5431		
Total Wet Weight, Lb	3425	1.53	1.63	5245	5602		
Adapter Weight, Lb	120			183	0		
Launch Weight, Lb	3545			5428	5602		

Low Cost Payload Characteristics

Foreign Domestic Communications Satellite, NCN-9 Date: 10 May 1971

Name	Current Expend-able	Expend-able Factor	Shuttle Factor	Low Cost Expend-able	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	11/5			11/2	11/2		
Launch Volume, Ft^3	151		~2.0	10200	1100	Comm. Sat. Density	
Launch Length, Ft	12			13	14		
Launch Diameter, Ft	4			10	10		
Structure/Mechanism Weight, Lb	200	0.515	0.685	680	886	Structural Weight Factor	SEO
Environmental Control Weight, Lb	25	~7.0	~7.0	175	175	Volume Ratio - Passive	OAO
Guidance/Navigation and Stabilization Weight, Lb	65	1.15	1.15	74	74	Spinner	BL
Dry Propulsion Weight, Lb	0	---	---	0	0		---
Propellant Weight, Lb	0	---	---	0	0		---
Dry Attitude Control Weight, Lb	40	6.62	6.62	265	265	Similar to SEO	SEO
Propellant Weight, Lb	80	~1.9	~2.0	61	64	Scaled by Weight and MMD	SEO
TT&C Weight, Lb	95	1.28	1.16	122	110		SEO
Electrical Weight, Lb	210	1.42	1.36	298	286	Fixed Array Type	OAO
Mission Equipment Weight, Lb	285	1.15	1.15	321	312	Communication	BL
Total Dry Weight, Lb	920			1935	2117		
Total Wet Weight, Lb	1000	2.00	2.18	1996	2181		
Adapter Weight, Lb	30			60	0		
Launch Weight, Lb	1030			2056	2181		

Low Cost Payload Characteristics

Navigation and Traffic Control Satellite, NCN-10 (A) & (B) Date: 10 May 1971

Name	Current Expend-able	Expend-able Factor	Shuttle Factor	Low Cost Expend-able	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	12/5			12/2	12/2		
Launch Volume, Ft^3	157		~5.3	282	315	Satellite Density Since Satellite is a 3-Axis Type	
Launch Length, Ft	8			8.5	9.5		
Launch Diameter, Ft	5			6.5	6.5		
Structure/Mechanism Weight, Lb	140	0.53	0.7	514	676	Structural Weight Factor	SEO
Environmental Control Weight, Lb	20	~2.0	~2.0	40	40	Volume Ratio - Passive	OAO
Guidance/Navigation and Stabilization Weight, Lb	40	1.28	1.28	51	51	3-Axis	SEO
Dry Propulsion Weight, Lb	0	---	---	0	0		---
Propellant Weight, Lb	0	---	---	0	0		---
Dry Attitude Control Weight, Lb	35	6.62	6.62	232	232	Similar to SEO	SEO
Propellant Weight, Lb	65	~2.0	~2.2	52	57	MMD and Weight Factors	SEO
TT&C Weight, Lb	75	1.28	1.16	96	87		SEO
Electrical Weight, Lb	190	1.81	1.81	344	344	Oriented Array	SEO
Mission Equipment Weight, Lb	135	1.15	1.15	155	155	Nav/Com.	BL
Total Dry Weight, Lb	635			1432	1585		
Total Wet Weight, Lb	700	2.12	2.34	1484	1642		
Adapter Weight, Lb	25			53	0		
Launch Weight, Lb	725			1537	1642		

Low Cost Payload Characteristics

Medical Network Satellite, NCN-11

Date: 10 May 1971

Name	Current Expend-able	Expend-able Factor	Shuttle Factor	Low Cost Expend-able	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	5/5			5/2	5/2		
Launch Volume, Ft^3	1700		~1.4	2540	2700	Comm. Satellite Density	
Launch Length, Ft	15			16.5	17.5		
Launch Diameter, Ft	12			14	14		
Structure/Mechanism Weight, Lb	400	0.485	0.635	1130	1445	Structural Weight Factor	SEO
Environmental Control Weight, Lb	50	~1.5	~1.5	75	75	Volume Ratio - Passive	OAO
Guidance/Navigation and Stabilization Weight, Lb	150	1.15	1.15	173	173	Spinner	BL
Dry Propulsion Weight, Lb	0	---	---	0	0		---
Propellant Weight, Lb	0	---	---	0	0		---
Dry Attitude Control Weight, Lb	70	6.62	6.62	464	464	Similar to SEO	SEO
Propellant Weight, Lb	140	~1.65	~1.7	93	95	Factored Using Cost and MMD	SEO
TT&C Weight, Lb	150	1.28	1.16	192	174		SEO
Electrical Weight, Lb	490	1.42	1.36	696	666	Fixed Type Array	OAO
Mission Equipment Weight, Lb	550	1.15	1.15	632	632	Low Cost Sensors - Not Like OAO or SEO	BL
Total Dry Weight, Lb	1860			3362	3629		
Total Wet Weight, Lb	2000	1.73	1.86	3455	3724		
Adapter Weight, Lb	70			121	0		
Launch Weight, Lb	2070			3576	3724		

Low Cost Payload Characteristics

Education Broadcast Satellite, NCN-12

Date: 10 May 1971

Name	Current Expend-able	Expend-able Factor	Shuttle Factor	Low Cost Expend-able	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	5/5			5/2	5/2		
Launch Volume, Ft^3	1960		~1.1	5650	5830	Use Com. Sat. Density	
Launch Length, Ft	25			32	33		
Launch Diameter, Ft	10			15	15		
Structure/Mechanism Weight, Lb	500	0.43	0.555	1810	2290	Structural Weight Factor	SEO
Environmental Control Weight, Lb	90	~3.0	~3.0	270	270	Volume Ratio - Passive	OAO
Guidance/Navigation and Stabilization Weight, Lb	320	1.15	1.15	328	328	Spinner	BL
Dry Propulsion Weight, Lb	0	---	---	0	0		---
Propellant Weight, Lb	0	---	---	0	0		---
Dry Attitude Control Weight, Lb	100	6.62	6.62	662	662	Similar to SEO	SEO
Propellant Weight, Lb	200	~1.7	~1.8	136	144	MMD - Weight Factors	SEO
TT&C Weight, Lb	200	1.28	1.16	256	232		SEO
Electrical Weight, Lb	990	1.42	1.36	1408	1347	Fixed Type Array	OAO
Mission Equipment Weight, Lb	1000	1.15	1.15	1150	1150	Com. Sat.	BL
Total Dry Weight, Lb	3200			5884	6279		
Total Wet Weight, Lb	3400	1.77	1.89	6020	6423		
Adapter Weight, Lb	120			213	0		
Launch Weight, Lb	3520			6233	6423		

Low Cost Payload Characteristics

Follow-On Systems Demonstration Satellite, NCN-13 Date: 10 May 1971

Name	Current Expend-able	Expend-able Factor	Shuttle Factor	Low Cost Expend-able	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	5/5			5/2	5/2		
Launch Volume, Ft^3	1690		~1.4	2540	2690	Use Com. Sat. Density	
Launch Length, Ft	15			16.5	17.5		
Launch Diameter, Ft	12			14	14		
Structure/Mechanism Weight, Lb	400	0.485	0.63	1120	1440	Structural Weight Factor	SEO
Environmental Control Weight, Lb	50	~1.6	~1.6	80	80	Volume Factor - Passive	OAO
Guidance/Navigation and Stabilization Weight, Lb	175	1.15	1.15	201	201	Spinner	BL
Dry Propulsion Weight, Lb	0	---	---	0	0		---
Propellant Weight, Lb	0	---	---	0	0		---
Dry Attitude Control Weight, Lb	80	6.62	6.62	530	530	Similar to SEO	SEO
Propellant Weight, Lb	300	~1.6	~1.8	192	216	MMD and Weight Factors	SEO
TT&C Weight, Lb	170	1.28	1.16	218	197		SEO
Electrical Weight, Lb	510	1.42	1.36	725	694	Fixed Type Array	OAO
Mission Equipment Weight, Lb	315	1.15	1.15	362	362	Not Similar to OAO or SEO	BL
Total Dry Weight, Lb	1700			3236	3504		
Total Wet Weight, Lb	2000	1.72	1.86	3428	3720		
Adapter Weight, Lb	70			120	0		
Launch Weight, Lb	2070			3548	3720		

Low Cost Payload Characteristics

Mars Viking Satellite, NPL-1

Date: 10 May 1971

Name	Current Expendable	Expendable Factor	Shuttle Factor	Low Cost Expendable	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	1/1			1/1			
Launch Volume, Ft^3	942	2.0		5120		Low Cost Volume Exceeds Available Shuttle Space When Tug is Used	
Launch Length, Ft	12			29			
Launch Diameter, Ft	10			15			
Structure/Mechanism Weight, Lb	518	0.515		700		Low Cost Structural Weight Applied to All Except Propulsion and Mission Equipment	SEO
Environmental Control Weight, Lb	37	~5.0		185		Volume Ratio - Active	SEO
Guidance/Navigation and Stabilization Weight, Lb	85	1.28		109		3-Axis	SEO
Dry Propulsion Weight, Lb	495	See Remarks		655		High Mass Fraction; $W_P = W_P' + 0.15\ (\Delta W_{Prop})$	BL
Propellant Weight, Lb	3285	See Remarks		4350		To Maintain Same Vacuum Velocity Capability, $W_P = 0.434\ W_O$	BL
Dry Attitude Control Weight, Lb	22	4.75		105		Similar to OAO	OAO
Propellant Weight, Lb	20	1.4		28		Total Weight Ratio	OAO
TT&C Weight, Lb	122	1.28		156			SEO
Electrical Weight, Lb	428	1.81		775		Oriented Array	SEO
Mission Equipment Weight, Lb	2558	1.15		2940		Reentry Vehicle Included (Decelerator, Antenna, RF Power, E. Power) - Wt. Included in Lander. Little Advantage to Increase Weight, Expensive Instr. (208 Lb)	BL
Total Dry Weight, Lb	4265			5625			
Total Wet Weight, Lb	7570	1.32		10003			
Adapter Weight, Lb	150			387			
Launch Weight, Lb	7720			10390			

Low Cost Payload Characteristics

Venus Explorer Orbiter, NPL-5

Date: 10 May 1971

Name	Current Expendable	Expendable Factor	Shuttle Factor	Low Cost Expendable	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	1/1			1/1		Compatible with Expendable or Shuttle	
Launch Volume, Ft^3	240	~4.8		481		Satellite Density	
Launch Length, Ft	12			12.5			
Launch Diameter, Ft	5			7			
Structure/Mechanism Weight, Lb	100	0.53		413		Low Cost Structural Weight Applied to All Except Propulsion and Mission Equipment	SEO
Environmental Control Weight, Lb	20	~2.0		40		Volume Ratio - Active	SEO
Guidance/Navigation and Stabilization Weight, Lb	30	1.28		38		3-Axis	SEO
Dry Propulsion Weight, Lb	70	See Remarks		148		High Mass Fraction; $W_P = W_P' + 0.15 (\Delta W_{Prop})$	BL
Propellant Weight, Lb	380	See Remarks		902		$W_P = 0.394\ W_O$, Vacuum Velocity Maintained	BL
Dry Attitude Control Weight, Lb	40	4.75		190		Needs Similar to OAO	OAO
Propellant Weight, Lb	70	~2.4		168		Total Weight Ratio	OAO
TT&C Weight, Lb	70	1.28		90			SEO
Electrical Weight, Lb	140	1.81		253		Oriented Array	SEO
Mission Equipment Weight, Lb	50	1.15		58		Instrumentation Similar to Upper Magnetosphere, Not Like SEO or OAO; Low Cost Experiment	BL
Total Dry Weight, Lb	520			1230			
Total Wet Weight, Lb	970	2.37		2300			
Adapter Weight, Lb	30			80			
Launch Weight, Lb	1000			2380			

Low Cost Payload Characteristics

Venus Radar Mapping, NPL-6 Date: 22 April 1971

Name	Current Expend-able	Expend-able Factor	Shuttle Factor	Low Cost Expend-able	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	2/2			2/2			
Launch Volume, Ft^3	940	1.8		10580		Satellite Density	
Launch Length, Ft	12			60			
Launch Diameter, Ft	10			15			
Structure/Mechanism Weight, Lb	318	0.5		862		Low Cost Structural Weight Applied to All Except Propulsion and Mission Equipment	SEO
Environmental Control Weight, Lb	60	~12.0		720		Volume Ratio - Passive	OAO
Guidance/Navigation and Stabilization Weight, Lb	50	1.28		64		3-Axis	SEO
Dry Propulsion Weight, Lb	670	See Remarks		2005		High Mass Fraction; $W_P = W_P' + 0.15\ (\Delta W_{Prop})$	BL
Propellant Weight, Lb	5700	See Remarks		14600		$W_P = 0.746\ W_O$, Vacuum Velocity Maintained	BL
Dry Attitude Control Weight, Lb	20	6.62		132		Needs Similar to SEO	SEO
Propellant Weight, Lb	29	~2.5		58		Mass Ratio	SEO
TT&C Weight, Lb	180	1.28		230			SEO
Electrical Weight, Lb	287	1.81		520		Oriented Array	SEO
Mission Equipment Weight, Lb	322	1.15		370		Side Looking Radar, High Data Rate, Not Like SEO or OAO	BL
Total Dry Weight, Lb	1907			4903			
Total Wet Weight, Lb	7636	2.56		19561			
Adapter Weight, Lb	264			739			
Launch Weight, Lb	7900			20300			

Low Cost Payload Characteristics

Venus Explorer Lander - First, NPL-7 Date: 19 May 1971

Name	Current Expendable	Expendable Factor	Shuttle Factor	Low Cost Expendable	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	1/1			1/1			
Launch Volume, Ft^3	2360	2.0		5266		Satellite Density	
Launch Length, Ft	2.5			29.5			
Launch Diameter, Ft	10			15			
Structure/Mechanism Weight, Lb	450	0.52		565		Low Cost Structural Weight Applied to All Except Propulsion and Mission Equipment	SEO
Environmental Control Weight, Lb	35	~2.5		88		Volume Ratio - Passive	OAO
Guidance/Navigation and Stabilization Weight, Lb	85	1.28		109		3-Axis	SEO
Dry Propulsion Weight, Lb	600	See Remarks		930		High Mass Fraction; $W_P = W_P' + 0.15\ (\Delta W_{Prop})$	BL
Propellant Weight, Lb	5000	See Remarks		7200		$W_P = 0.689\ W_O$, Vacuum Velocity Maintained	BL
Dry Attitude Control Weight, Lb	20	4.75		95		Needs Similar to OAO	OAO
Propellant Weight, Lb	20	~1.5		30		Weight Ratio	OAO
TT&C Weight, Lb	100	1.28		128			SEO
Electrical Weight, Lb	350	1.81		634		Oriented Array	SEO
Mission Equipment Weight, Lb	600	1.10		660		Reentry Vehicle Included, Equipment Must Operate at High Temperature (500 Deg F) and High Atmospheric Pressure - Similar Parts to Lunar Orbiter & Surveyor -	BL
Total Dry Weight, Lb	2240			3209		Technology Problems	
Total Wet Weight, Lb	7260	1.44		10439			
Adapter Weight, Lb	160			361			
Launch Weight, Lb	7420			10800			

Low Cost Payload Characteristics

Venus Explorer Lander - Second, NPL-8

Date 19 May 1971

Name	Current Expendable	Expendable Factor	Shuttle Factor	Low Cost Expendable	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	1/1			1/1			
Launch Volume, Ft^3	1963	2.65		2375		Satellite Density	
Launch Length, Ft	25			21			
Launch Diameter, Ft	10			12			
Structure/Mechanism Weight, Lb	350	0.53		483		Low Cost Structural Weight Applied to All Except Propulsion and Mission Equipment	SEO
Environmental Control Weight, Lb	30	~1.0		30		Volume Ratio - Passive	OAO
Guidance/Navigation and Stabilization Weight, Lb	70	1.28		90		3-Axis	SEO
Dry Propulsion Weight, Lb	350	See Remarks		458		Apply High Mass Fraction; $W_P = W_P' + 0.15\ (\Delta W_{Prop})$	BL
Propellant Weight, Lb	2200	See Remarks		2920		Maintain Same Velocity Capability $W_P = 0.473\ W_O$	BL
Dry Attitude Control Weight, Lb	20	4.75		95		Needs Similar to OAO	OAO
Propellant Weight, Lb	20	~1.3		26		Total Weight Ratio	OAO
TT&C Weight, Lb	100	1.28		128			SEO
Electrical Weight, Lb	300	1.81		542		Oriented Type Array	SEO
Mission Equipment Weight, Lb	1210	1.15		1390		Reentry Vehicle Included, Equipt. Must Operate at High Temp & High Atmos. - Orbiting Parts Like SEO and Lander is Like NPL-7	BL
Total Dry Weight, Lb	2430			3216			
Total Wet Weight, Lb	4650	1.33		6162			
Adapter Weight, Lb	100			228			
Launch Weight, Lb	4750			6390			

Low Cost Payload Characteristics
Jupiter Orbiter (Pioneer), NPL-11

Date: 10 May 1971

Name	Current Expendable	Expendable Factor	Shuttle Factor	Low Cost Expendable	Low Cost Shuttle	Remarks	Cost Base
System Life/MMD, Yr.	2/2			2/2			
Launch Volume, Ft^3	1180	4.7		1178		Use Existing Volume Since Low Cost Volume is Less	
Launch Length, Ft	15			15			
Launch Diameter, Ft	10			10			
Structure/Mechanism Weight, Lb	100	0.53		433		Low Cost Structural Weight Applied to All Except Propulsion and Mission Equipment	SEO
Environmental Control Weight, Lb	20	~1.0		20		Volume Ratio - Active	SEO
Guidance/Navigation and Stabilization Weight, Lb	30	1.28		38		3-Axis	SEO
Dry Propulsion Weight, Lb	65	See Remarks		139		High Mass Fraction; $W_P = W_P' + 0.15\ (\Delta W_{Prop})$	BL
Propellant Weight, Lb	325	See Remarks		817		Maintain Same Vacuum Velocity Capability $W_P = 0.361\ W_O$	BL
Dry Attitude Control Weight, Lb	40	6.62		265		Like SEO	SEO
Propellant Weight, Lb	70	~2.4		168		Total Weight Ratio	SEO
TT&C Weight, Lb	70	1.28		90			SEO
Electrical Weight, Lb	130	1.81		236		Oriented Type Array	SEO
Mission Equipment Weight, Lb	50	1.15		58		Instrumentation Like Upper Magnetosphere	BL
Total Dry Weight, Lb	505			1279			
Total Wet Weight, Lb	900	2.52		2264			
Adapter Weight, Lb	30			76			
Launch Weight, Lb	930			2340			

APPENDIX 4
PAYLOAD DATA

This Appendix contains the listing of NASA payload data used in the traffic and cost results. The DoD payload data is listed in the classified volume of this report (Volume VI). The listing has been broken down into the following tables:

Table A4-1. NASA and Non-NASA Current Expendable Payload Data

Index of Defined Satellites

Table A4-1, Index of Defined Satellites, Cont'd

Table A4-1, Index of Defined Satellites, Cont'd

LARGE STELLAR TELESCOPE NAS-1 06/11/71

MISS. OBJ. EXTEND SPACE ASTRONOMY CAPABILITY TO DIFFRACTION LIMITED 3 M DIA. OPTICAL TECHNOLOGY. HIGH RESOLUTION SPECTRONOMY AND IMAGING OF PLANETARY BODIES.

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
CURR.EXP.	N ASTRNOMY	NASA	1	2.6480E+04	350.0	28.50	350.0	350.0
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
0.	450.0	250.0	450.0	250.0	55.00	28.50	...NONE...	TIIIC
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
ETR	1981	0	0	1	0	1	0	1
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
0	1	0	1	0	5	10	2.000	MAINT.
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
RPL.EXP.	5000	5000	5973	45.00	13.00	TV CAMERA	PHTO CAMRA	SPCTRPHTO
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
SPCTRSCPE	POLRMTRY	1.0 SEC	1500	8650	1300	770	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
500	315	500	1310	8270	20985	21300	1000	22300
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
EXO	LIQUID	HYDRAZINE	3-AXIS	SOLAR	TRANSTAGE	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

LARGE SOLAR OBSERVATORY NAS-2B 06/11/71

MISS. OBJ. CONDUCT HIGH RESOLUTION VISUAL AND UV STUDIES OF SOLAR GRANULAR STRUCTURE AND AREAS OF HIGH SOLAR ACTIVITIES. CONTINUE UV AND X-RAY OBSERVATIONS WITH HIGHER SPATIAL AND SPECTRAL RESOLUTIONS (MAN MAINT.)

PAYLOAD CURR.EXP.	PROGRAM N ASTRNOMY	AGENCY NASA	NO SATS 1	CHAR VELOC 2.6480E+04	CIRC ALTIT 350.0	NOM INCLIN 30.00	NOM APOG 350.0	NOM PERIG 350.0
NOM ECCENT 0.	MAX APOG 400.0	MIN APOG 300.0	MAX PERIG 400.0	MIN PERIG 300.0	MAX INCLIN 55.00	MIN INCLIN 28.50	LCH WINDOW ...NONE...	LCH VEH 1 TIIID
LCH SITE 1 ETR	IN LCH DAT 1983	FLTS 1979 0	FLTS 1980 0	FLTS 1981 0	FLTS 1982 0	FLTS 1983 1	FLTS 1984 0	FLTS 1985 1
FLTS 1986 0	FLTS 1987 1	FLTS 1988 0	FLTS 1989 1	FLTS 1990 0	TOTAL FLTS 4	SYS LF 10	MEAN MISS .5000	TYPE MNT R IVA MAINT.
EXP MNT PH RPL.EXP.	MAX PLD VS 1.0000E+04	MIN PLD VS 1.0000E+04	LCH VOLUME 10073	LCH LENGTH 57.00	LCH DIAM 15.00	SENSOR 1 TELESCOPE	SENSOR 2 UV SPECTR.	SENSOR 3 CORONGRPH
SENSOR 4 SPCTRGRPH	SENSOR 5 SLR.MAG.FD	POINT ACC 0.1 SEC	AV PWR 1500	ST M V A W 9681	ENV CONT W 2262	GD NA ST W 1953	PROPULS W 0	P PROPEL W 0
ATT CONT W 3721	A.C.PROP. 2560	TTC W 381	ELEC W 1934	MISS EQ W 6875	TOTAL D W 24247	TO W IN EX 26807	ADAPTER W 900	LAUNCH W 27707
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK CENTAUR	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

LARGE RADIO OBSERVATORY NAS-3 06/11/71

MISS. OBJ. UNDERSTAND PHYSICAL PROCESSES IN THE SOLAR CORONA AND IN THE MAGNETOSPHERES OF THE PLANETS, ESPECIALLY JUPITER AND EARTH.

PAYLOAD CURR.EXP.	PROGRAM N ASTRNOMY	AGENCY NASA	NO SATS 1	CHAR VELOC 2.6480E+04	CIRC ALTIT 350.0	NOM INCLIN 30.00	NOM APOG 350.0	NOM PERIG 350.0
NOM ECCENT 0.	MAX APOG 350.0	MIN APOG 350.0	MAX PERIG 350.0	MIN PERIG 350.0	MAX INCLIN 55.00	MIN INCLIN 28.50	LCH WINDOW ...NONE...	LCH VEH 1 TIIIC
LCH SITE 1 ETR	IN LCH DAT 1985	FLTS 1979 0	FLTS 1980 0	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 1
FLTS 1986 0	FLTS 1987 1	FLTS 1988 0	FLTS 1989 1	FLTS 1990 0	TOTAL FLTS 3	SYS LF 10	MEAN MISS 2.000	TYPE MNT R MAINT.
EXP MNT PH RPL.EXP.	MAX PLD VS 3500	MIN PLD VS 3500	LCH VOLUME 4618	LCH LENGTH 30.00	LCH DIAM 14.00	SENSOR 1 BOLOMETER	SENSOR 2 ELF DETECT	SENSOR 3 VHF DETECT
SENSOR 4 UHF DETECT	SENSOR 5 MICROWAVE	POINT ACC 1.0 SEC	AV PWR 2000	ST M V A W 3000	ENV CONT W 1000	GD NA ST W 2000	PROPULS W 0	P PROPEL W 0
ATT CONT W 1000	A.C.PROP. 700	TTC W 700	ELEC W 1600	MISS EQ W 10000	TOTAL D W 18600	TO W IN EX 19300	ADAPTER W 700	LAUNCH W 20000
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK TRANSTAGE	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

HIGH ENERGY ASTRONOMY OBSERVAT NAS-4 06/11/71

MISS. OBJ. TO PERFORM A SURVEY OF THE CELESTIAL SPHERE WITH PRIMARY EMPHASIS ON THE GALACTIC BELT REGION. SECONDARY OBJECTIVE IS POINTING AT SPECIFIC CELESTIAL TARGET.

PAYLOAD CURR.EXP.	PROGRAM N ASTRNOMY	AGENCY NASA	NO SATS 1	CHAR VELOC 2.6000E+04	CIRC ALTIT 200.0	NOM INCLIN 30.00	NOM APOG 200.0	NOM PERIG 200.0
NOM ECCENT 0.	MAX APOG 230.0	MIN APOG 170.0	MAX PERIG 230.0	MIN PERIG 170.0	MAX INCLIN 28.50	MIN INCLIN 28.50	LCH WINDOW ...NONE...	LCH VEH 1 TIIIC
LCH SITE 1 ETR	IN LCH DAT 1979	FLTS 1979 1	FLTS 1980 0	FLTS 1981 1	FLTS 1982 0	FLTS 1983 1	FLTS 1984 0	FLTS 1985 1
FLTS 1986 0	FLTS 1987 1	FLTS 1988 0	FLTS 1989 1	FLTS 1990 0	TOTAL FLTS 6	SYS LF 10	MEAN MISS 2.000	TYPE MNT R MAINT.
EXP MNT PH RPL.EXP.	MAX PLD VS 3500	MIN PLD VS 3500	LCH VOLUME 4752	LCH LENGTH 50.00	LCH DIAM 11.00	SENSOR 1 X-RAY DET	SENSOR 2 G-RAY DET	SENSOR 3 G-RAY TELE
SENSOR 4 C-RAY DET	SENSOR 5 C-RAY CALR	POINT ACC 0.1 DEG	AV PWR 820.0	ST M V A W 3000	ENV CONT W 500	GD NA ST W 1500	PROPULS W 0	P PROPEL W 0
ATT CONT W 1000	A.C.PROP. 700	TTC W 700	ELEC W 1780	MISS EQ W 12270	TOTAL D W 20050	TO W IN EX 20750	ADAPTER W 700	LAUNCH W 21450
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK TRANSTAGE	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. TO MONITOR ALL THE SOLAR SPHERE SIMULTANEOUSLY AND TO CONTINUOUSLY PROVIDE INFORMATION ON FLARES, SUNSPOTS, AND SOLAR WIND.

PAYLOAD CURR.EXP.	PROGRAM N ASTRNOMY	AGENCY NASA	NO SATS 1	CHAR VELOC 3.8500E+04	CIRC ALTIT 1.9323E+04	NOM INCLIN 30.00	NOM APOG 1.9323E+04	NOM PERIG 1.9323E+04
NOM ECCENT 0.	MAX APOG 1.9353E+04	MIN APOG 1.9293E+04	MAX PERIG 1.9353E+04	MIN PERIG 1.9293E+04	MAX INCLIN 40.00	MIN INCLIN 0.	LCH WINDOW ...NONE...	LCH VEH 1 TIIIC
LCH SITE 1 ETR	IN LCH DAT 1984	FLTS 1979 0	FLTS 1980 0	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 1	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 1	FLTS 1990 0	TOTAL FLTS 2	SYS LF 10	MEAN MISS 2.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 942	LCH LENGTH 12.00	LCH DIAM 10.00	SENSOR 1 PHOTOMULTI	SENSOR 2 PROP.CTRS.	SENSOR 3 SLD-ST DET
SENSOR 4 X-RAY	SENSOR 5 TV CAMERA	POINT ACC 4 DEG	AV PWR 200.0	ST M V A W 300	ENV CONT W 50	GD NA ST W 150	PROPULS W 0	P PROPEL W 0
ATT CONT W 200	A.C.PROP. 140	TTC W 150	ELEC W 220	MISS EQ W 750	TOTAL D W 1680	TO W IN EX 1820	ADAPTER W 60	LAUNCH W 1880
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C SPIN	TYPE EP SOLAR	TYPE KICK TRANSTAGE	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. TO MONITOR ALL THE SOLAR SPHERE SIMULTANEOUSLY AND TO CONTINUOUSLY PROVIDE INFORMATION ON FLARES, SUNSPOTS, AND SOLAR WIND.

PAYLOAD CURR.EXP.	PROGRAM N ASTRNOMY	AGENCY NASA	NO SATS 1	CHAR VELOC 4.0000E+04	CIRC ALTIT 8.0800E+07	NOM INCLIN 28.50	NOM APOG 8.0800E+07	NOM PERIG 8.0800E+07
NOM ECCENT 0.	MAX APOG 8.0800E+07	MIN APOG 8.0800E+07	MAX PERIG 8.0800E+07	MIN PERIG 8.0800E+07	MAX INCLIN 40.00	MIN INCLIN 0.	LCH WINDOW ...NONE...	LCH VEH 1 TIIIC
LCH SITE 1 ETR	IN LCH DAT 1984	FLTS 1979 0	FLTS 1980 0	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 1	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 1	FLTS 1990 0	TOTAL FLTS 2	SYS LF 10	MEAN MISS 5.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 942	LCH LENGTH 12.00	LCH DIAM 10.00	SENSOR 1 PHOTOMULTI	SENSOR 2 PROP.CTRS.	SENSOR 3 SLD-ST DET
SENSOR 4 X-RAY	SENSOR 5 TV CAMERA	POINT ACC 4 DEG	AV PWR 1500	ST M V A W 350	ENV CONT W 50	GD NA ST W 150	PROPULS W 0	P PROPEL W 0
ATT CONT W 240	A.C.PROP. 160	TTC W 150	ELEC W 750	MISS EQ W 750	TOTAL D W 2280	TO W IN EX 2440	ADAPTER W 80	LAUNCH W 2520
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C SPIN	TYPE EP SOLAR	TYPE KICK TRANSTAGE	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

OPTICAL INTERFEROMETER A NAS-9

06/11/71

MISS. OBJ. TO MEASURE STELLAR DIAMETERS AND IR SPECTRA. THIS IS ACHIEVED BY USING TWO SPACECRAFT (A) AND (B).

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
CURR.EXP.	N ASTRNOMY	NASA	1	3.8550E+04	1.9323E+04	30.00	1.9323E+04	1.9323E+04
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
0.	1.9343E+04	1.9303E+04	1.9343E+04	1.9303E+04	40.00	0.	...NONE...	TIIIC
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
ETR	1988	0	0	0	0	0	0	0
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
0	0	1	0	0	1	5	5.000	MAINT.
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
RPL.EXP.	100.0	100.0	385	10.00	7.000	BOLOMETER	LASER	IR
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
NO ENTRY	*NO ENTRY*	1 SEC	230.0	600	300	500	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
300	200	250	310	750	2810	3010	130	3140
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
EXO	LIQUID	HYDRAZINE	3-AXIS	SOLAR	TRANSTAGE	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

OPTICAL INTERFEROMETER B NAS-10 06/11/71

MISS. OBJ. TO MEASURE STELLAR DIAMETERS AND IR SPECTRA. THIS IS ACHIEVED BY USING TWO SPACECRAFT (A) AND (B).

PAYLOAD CURR.EXP.	PROGRAM N ASTRNOMY	AGENCY NASA	NO SATS 1	CHAR VELOC 3.8550E+04	CIRC ALTIT 1.9323E+04	NOM INCLIN 30.00	NOM APOG 1.9323E+04	NOM PERIG 1.9323E+04
NOM ECCENT 0.	MAX APOG 1.9343E+04	MIN APOG 1.9303E+04	MAX PERIG 1.9343E+04	MIN PERIG 1.9303E+04	MAX INCLIN 40.00	MIN INCLIN 0.	LCH WINDOW ...NONE...	LCH VEH 1 TIIIC
LCH SITE 1 ETR	IN LCH DAT 1988	FLTS 1979 0	FLTS 1980 0	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 1	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 1	SYS LF 5	MEAN MISS 5.000	TYPE MNT R MAINT.
EXP MNT PH RPL.EXP.	MAX PLD VS 100.0	MIN PLD VS 100.0	LCH VOLUME 385	LCH LENGTH 10.00	LCH DIAM 7.000	SENSOR 1 BOLOMETER	SENSOR 2 LASER	SENSOR 3 IR
SENSOR 4 *NO ENTRY*	SENSOR 5 *NO ENTRY*	POINT ACC 1 SEC	AV PWR 230.0	ST M V A W 600	ENV CONT W 300	GD NA ST W 500	PROPULS W 0	P PROPEL W 0
ATT CONT W 300	A.C.PROP. 200	TTC W 250	ELEC W 310	MISS EQ W 750	TOTAL D W 2810	TO W IN EX 3010	ADAPTER W 130	LAUNCH W 3140
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK TRANSTAGE	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

RADIO INTERFEROMETER NAS-11 06/11/71

MISS. OBJ. TO MEASURE RADIO SPECTRA AND RADIO DIAMETER OF SPACE OBJECTS, ALSO VELOCITIES.

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
CURR.EXP.	N ASTRNOMY	NASA	2	3.9250E+04	3.8646E+04	28.50	3.8646E+04	3.8646E+04
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
0.	3.8648E+04	3.8644E+04	3.8648E+04	3.8644E+04	38.50	0.	...NONE...	TIIIF
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
ETR	1981	0	0	2	0	0	0	0
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
0	0	0	0	0	2	3	3.000	SET-UP
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
FAILURE	*NO ENTRY*	*NO ENTRY*	3848	25.00	14.00	VLF DETECT	HF DETECT	UHF DETECT
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
MICROWAVE	*NO ENTRY*	0.5 SEC	300.0	2000	500	2000	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
700	500	450	450	3900	9500	10000	350	10350
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
EXO	LIQUID	HYDRAZINE	3-AXIS	SOLAR	CENTAUR	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

ASTRONOMY EXPLORER NAS-14A 06/11/71

MISS. OBJ. INDEPENDENT INVESTIGATIONS OF SOLAR AND STELLAR BEHAVIOR IN THE UV, X-RAY AND RADIO SPECTRAL REGIONS. NOT PART OF OBSERVATORY.

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
CURR.EXP.	N ASTRNOMY	NASA	1	2.6200E+04	270.0	28.50	270.0	270.0
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
0.	270.0	270.0	270.0	270.0	28.50	28.50	...NONE...	T3C
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
ETR	1979	2	0	1	2	2	1	0
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
2	1	2	2	0	15	3	3.000	...NONE...
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
...NONE...	0.	0.	64	4.000	4.500	TV CAMERA	UHF DETECT	C-RAY DET
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
VN ALN DET	LASER	10 SEC	100.0	200	15	40	110	80
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
34	20	50	161	250	760	860	30	890
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
EXO	LIQUID	GN2	3-AXIS	SOLAR	...NONE...	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

C.4.

ASTRONOMY EXPLORER NAS-14B 06/11/71

MISS. OBJ. INDEPENDENT INVESTIGATIONS OF SOLAR AND STELLAR BEHAVIOR IN THE UV, X-RAY AND RADIO SPECTRAL REGIONS. NOT PART OF OBSERVATORY.

PAYLOAD CURR.EXP.	PROGRAM N ASTRNOMY	AGENCY NASA	NO SATS 1	CHAR VELOC 3.9700E+04	CIRC ALTIT 1.9323E+04	NOM INCLIN 0.	NOM APOG 1.9323E+04	NOM PERIG 1.9323E+04
NOM ECCENT 0.	MAX APOG 1.9323E+04	MIN APOG 1.9323E+04	MAX PERIG 1.9323E+04	MIN PERIG 1.9323E+04	MAX INCLIN 0.	MIN INCLIN 0.	LCH WINDOW ...NONE...	LCH VEH 1 TIIIB
LCH SITE 1 ETR	IN LCH DAT 1980	FLTS 1979 0	FLTS 1980 2	FLTS 1981 1	FLTS 1982 0	FLTS 1983 0	FLTS 1984 1	FLTS 1985 2
FLTS 1986 0	FLTS 1987 1	FLTS 1988 0	FLTS 1989 0	FLTS 1990 2	TOTAL FLTS 9	SYS LF 3	MEAN MISS 3.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 64	LCH LENGTH 4.000	LCH DIAM 4.500	SENSOR 1 TV CAMERA	SENSOR 2 UHF DETECT	SENSOR 3 C-RAY DET
SENSOR 4 VN ALN DET	SENSOR 5 LASER	POINT ACC 10 SEC	AV PWR 100.0	ST M V A W 200	ENV CONT W 15	GD NA ST W 40	PROPULS W 110	P PROPEL W 80
ATT CONT W 34	A.C.PROP. 20	TTC W 50	ELEC W 161	MISS EQ W 250	TOTAL D W 760	TO W IN EX 860	ADAPTER W 30	LAUNCH W 890
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE GN2	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK CENTAUR	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

ORBITING SOLAR OBSERVATORY NAS-15 06/11/71

MISS. OBJ. MONITOR TEMPORAL VARIATIONS OF THE SUNS BRIGHTNESS IN THE UV,X-RAY AND GAMMA-RAY REGIONS.

PAYLOAD CURR.EXP.	PROGRAM N ASTRNOMY	AGENCY NASA	NO SATS 1	CHAR VELOC 2.6480E+04	CIRC ALTIT 350.0	NOM INCLIN 28.50	NOM APOG 350.0	NOM PERIG 350.0
NOM ECCENT 0.	MAX APOG 400.0	MIN APOG 300.0	MAX PERIG 400.0	MIN PERIG 300.0	MAX INCLIN 58.50	MIN INCLIN 0.	LCH WINDOW ...NONE...	LCH VEH 1 TIIIC
LCH SITE 1 ETR	IN LCH DAT 1980	FLTS 1979 0	FLTS 1980 1	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 1	SYS LF 1	MEAN MISS 1.000	TYPE MNT R MAINT
EXP MNT PH REPLACE	MAX PLD VS 30.00	MIN PLD VS 10.00	LCH VOLUME 385	LCH LENGTH 10.00	LCH DIAM 7.000	SENSOR 1 SPCTRMTRS	SENSOR 2 PHTOMTRS	SENSOR 3 X-RAY SENS
SENSOR 4 UV SENS	SENSOR 5 VIDICON	POINT ACC 5 SEC	AV PWR 300.0	ST M V A W 400	ENV CONT W 70	GO NA ST W 200	PROPULS W 0	P PROPEL W 0
ATT CONT W 220	A.C.PROP. 150	TTC W 160	ELEC W 350	MISS EQ W 500	TOTAL D W 1750	TO W IN EX 1900	ADAPTER W 80	LAUNCH W 1980
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK DELTA	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. TO CONDUCT INVESTIGATIONS OF THE ENVIRONMENT OF THE LOWER MAGNETOSPHERE, NEUTRAL AIR CHEMISTRY AND DENSITY AND IONOSPHERIC BEHAVIOR.

PAYLOAD CURR.EXP.	PROGRAM N SPA PHYS	AGENCY NASA	NO SATS 1	CHAR VELOC 2.8000E+04	CIRC ALTIT ...NONE...	NOM INCLIN ...NONE...	NOM APOG 1800	NOM PERIG 180.0
NOM ECCENT .1825	MAX APOG 2000	MIN APOG 1600	MAX PERIG 200.0	MIN PERIG 100.0	MAX INCLIN 90.00	MIN INCLIN 28.50	LCH WINDOW ...NONE...	LCH VEH 1 TIIIC
LCH SITE 1 ETR	IN LCH DAT 1979	FLTS 1979 1	FLTS 1980 1	FLTS 1981 1	FLTS 1982 1	FLTS 1983 1	FLTS 1984 1	FLTS 1985 1
FLTS 1986 1	FLTS 1987 1	FLTS 1988 1	FLTS 1989 1	FLTS 1990 1	TOTAL FLTS 12	SYS LF 3	MEAN MISS 1.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 100	LCH LENGTH 8.000	LCH DIAM 4.000	SENSOR 1 UV DETECT	SENSOR 2 CURR.COLL	SENSOR 3 VLF RECVRS
SENSOR 4 MASS SPECT	SENSOR 5 MAGNETOMET	POINT ACC 2 DEG	AV PWR 100.0	ST M V A W 240	ENV CONT W 30	GD NA ST W 80	PROPULS W 0	P PROPEL W 0
ATT CONT W 520	A.C.PROP. 450	TTC W 100	ELEC W 90	MISS EQ W 100	TOTAL D W 710	TO W IN EX 1160	ADAPTER W 40	LAUNCH W 1200
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C SPIN	TYPE EP SOLAR	TYPE KICK DELTA	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. TO MEASURE IONOSPHERIC CURRENT SYSTEMS AND BEHAVIOR WITH RESPECT TO SOLAR ACTIVITY, ALSO NEUTRAL ATMOSPHERE STUDIES.

PAYLOAD CURR.EXP.	PROGRAM N SPA PHYS	AGENCY NASA	NO SATS 1	CHAR VELOC 3.6301E+04	CIRC ALTIT ...NONE...	NOM INCLIN ...NONE...	NOM APOG 2.0000E+04	NOM PERIG 1000
NOM ECCENT .6810	MAX APOG 6.0000E+04	MIN APOG 2.0000E+04	MAX PERIG 1000	MIN PERIG 100.0	MAX INCLIN 90.00	MIN INCLIN 28.50	LCH WINDOW ...NONE...	LCH VEH 1 T9C
LCH SITE 1 ETR	IN LCH DAT 1979	FLTS 1979 1	FLTS 1980 1	FLTS 1981 1	FLTS 1982 1	FLTS 1983 1	FLTS 1984 1	FLTS 1985 1
FLTS 1986 1	FLTS 1987 1	FLTS 1988 1	FLTS 1989 1	FLTS 1990 1	TOTAL FLTS 12	SYS LF 3	MEAN MISS 1.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 226	LCH LENGTH 8.000	LCH DIAM 6.000	SENSOR 1 SLD-ST DET	SENSOR 2 ION-CR MON	SENSOR 3 ELE-CR MON
SENSOR 4 PHTOMULTIP	SENSOR 5 SCINT.CNT	POINT ACC 2 DEG	AV PWR 100.0	ST M V A W 215	ENV CONT W 30	GD NA ST W 70	PROPULS W 0	P PROPEL W 0
ATT CONT W 360	A.C.PROP. 700	TTC W 100	ELEC W 90	MISS EQ W 100	TOTAL D W 665	TO W IN EX 965	ADAPTER W 35	LAUNCH W 1000
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C SPIN	TYPE EP SOLAR	TYPE KICK DELTA/364	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. TO MONITOR SPACE WEATHER AND THE BOUNDARY OF THE GEOMAGNETIC FIELD AS IT INTERACTS WITH THE SOLAR WIND.

PAYLOAD CUPR.EXP.	PROGRAM N SPA PHYS	AGENCY NASA	NO SATS 1	CHAR VELOC 4.0000E+04	CIRC ALTIT 8.0800E+07	NOM INCLIN ...NONE...	NOM APOG 8.0800E+07	NOM PERIG 8.0800E+07
NOM ECCENT 0.	MAX APOG 8.0800E+07	MIN APOG 8.0800E+07	MAX PERIG 8.0800E+07	MIN PERIG 8.0800E+07	MAX INCLIN 90.00	MIN INCLIN 28.50	LCH WINDOW ...NONE...	LCH VEH 1 TIIIC
LCH SITE 1 ETR	IN LCH DAT 1979	FLTS 1979 1	FLTS 1980 1	FLTS 1981 1	FLTS 1982 1	FLTS 1983 1	FLTS 1984 1	FLTS 1985 1
FLTS 1986 1	FLTS 1987 1	FLTS 1988 1	FLTS 1989 1	FLTS 1990 1	TOTAL FLTS 12	SYS LF 3	MEAN MISS 1.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 75	LCH LENGTH 6.000	LCH DIAM 4.000	SENSOR 1 MAG.FD.SEN	SENSOR 2 ENRGY.SPEC	SENSOR 3 SOLR.WD.DE
SENSOR 4 *NO ENTRY*	SENSOR 5 *NO ENTRY*	POINT ACC *NO ENTRY*	AV PWR 300.0	ST M V A W 120	ENV CONT W 20	GD NA ST W 30	PROPULS W 0	P PROPEL W 0
ATT CONT W 90	A.C.PROP. 60	TTC W 70	ELEC W 100	MISS EQ W 150	TOTAL D W 520	TO W IN EX 580	ADAPTER W 20	LAUNCH W 600
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C SPIN	TYPE EP SOLAR	TYPE KICK DELTA/364	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. TO EXPERIMENTALLY TEST EINSTEINS GENERAL RELATIVITY THEORY. GYROSCOPES IN AN EARTH-ORBITING SATELLITE WILL EXPERIENCE TWO RELATIVISTIC PRECESSION EFFECTS.

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
CURR.EXP.	N SPA PHYS	NASA	1	2.6300E+04	300.0	90.00	300.0	300.0
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
0.	350.0	300.0	350.0	300.0	95.00	85.00	...NONE...	T3C
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
ETR	1984	0	0	0	0	0	1	0
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
0	0	0	0	1	2	1	1.000	...NONE...
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
...NONE...	0.	0.	137	7.000	5.000	GYRO	CHG.PART.	IR
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
MAGNETOMET	*NO ENTRY*	1 SEC	700.0	200	50	150	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
100	80	120	480	350	1370	1450	50	1500
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
EXO	LIQUID	GN2	3-AXIS	SOLAR	DELTA	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

GENERAL RELATIVITY NSP-7 06/11/71

MISS. ORJ. TO EXPERIMENTALLY TEST EINSTEINS GENERAL RELATIVITY THEORY. GYROSCOPES IN AN EARTH-ORBITING SATELLITE WILL EXPERIENCE TWO RELATIVISTIC PRECESSION EFFECTS.

PAYLOAD CURR.EXP.	PROGRAM N SPA PHYS	AGENCY NASA	NO SATS 1	CHAR VELOC 4.0000E+04	CIRC ALTIT 8.0800E+07	NOM INCLIN 28.50	NOM APOG 8.0800E+07	NOM PERIG 8.0800E+07
NOM ECCENT 0.	MAX APOG 8.0800E+07	MIN APOG 8.0800E+07	MAX PERIG 8.0800E+07	MIN PERIG 8.0800E+07	MAX INCLIN 28.50	MIN INCLIN 28.50	LCH WINDOW ...NONE...	LCH VEH 1 T9C
LCH SITE 1 ETR	IN LCH DAT 1981	FLTS 1979 0	FLTS 1980 0	FLTS 1981 1	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 0
FLTS 1986 0	FLTS 1987 1	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 2	SYS LF 1	MEAN MISS 1.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 63	LCH LENGTH 5.000	LCH DIAM 4.000	SENSOR 1 GYRO	SENSOR 2 CHG.PART.	SENSOR 3 IR
SENSOR 4 MAGNETOM	SENSOR 5 *NO ENTRY*	POINT ACC 1 SEC	AV PWR 300.0	ST M V A W 70	ENV CONT W 10	GD NA ST W 25	PROPULS W 0	P PROPEL W 0
ATT CONT W 80	A.C.PROP. 50	TTC W 60	ELEC W 120	MISS EQ W 120	TOTAL D W 435	TO W IN EX 485	ADAPTER W 15	LAUNCH W 500
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE GN2	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK DELTA/364	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

POLAR EARTH OBSERVATION SATELL NEO-2 06/11/71

MISS. OBJ. TO DESIGN, DEVELOP AND OPERATE A SPACE OBSERVATORY SYSTEM TO PERFORM METEOROLOGICAL AND EARTH RESOURCES SURVEYING BY ADVANCED REMOTE SENSING TECHNIQUES.

PAYLOAD CURR.EXP.	PROGRAM N EAR OBS	AGENCY NASA	NO SATS 1	CHAR VELOC 2.6950E+04	CIRC ALTIT 500.0	NOM INCLIN 100.0	NOM APOG 500.0	NOM PERIG 500.0
NOM ECCENT 0.	MAX APOG 550.0	MIN APOG 450.0	MAX PERIG 550.0	MIN PERIG 450.0	MAX INCLIN 102.0	MIN INCLIN 90.00	LCH WINDOW ...NONE...	LCH VEH 1 T9C
LCH SITE 1 WTR	IN LCH DAT 1979	FLTS 1979 1	FLTS 1980 1	FLTS 1981 1	FLTS 1982 1	FLTS 1983 1	FLTS 1984 1	FLTS 1985 1
FLTS 1986 1	FLTS 1987 1	FLTS 1988 1	FLTS 1989 1	FLTS 1990 1	TOTAL FLTS 12	SYS LF 2	MEAN MISS 2.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 1696	LCH LENGTH 15.00	LCH DIAM 12.00	SENSOR 1 MICROWAVE	SENSOR 2 IR RADIO	SENSOR 3 RADAR SCAT
SENSOR 4 IR SCANNER	SENSOR 5 OPTICS	POINT ACC .07 DEG	AV PWR 600.0	ST M V A W 370	ENV CONT W 60	GD NA ST W 200	PROPULS W 0	P PROPEL W 0
ATT CONT W 240	A.C.PROP. 160	TTC W 190	ELEC W 600	MISS EQ W 850	TOTAL D W 2340	TO W IN EX 2500	ADAPTER W 90	LAUNCH W 2590
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK DELTA/364	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. RESEARCH SATELLITE TO INVESTIGATE AND DEVELOP REMOTE SENSING TECHNIQUES FOR MEASUREMENT OF THE EARTHS SURFACE AND ATMOSPHERE FROM SYNC. ALTITUDE

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
CURR.EXP.	NEAR.OBS.	NASA	1	3.9700E+04	1.9323E+04	0.0	1.9323E+04	1.9323E+04
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
0.0	1.9323E+04	1.9323E+04	1.9323E+04	1.9323E+04	0.0	0.0	...NONE...	TIIIB
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
ETR	1980	0	1	0	1	0	1	0
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
1	0	1	0	1	6	2	2.000	...NONE...
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
...NONE...	0.	0.	75	6.000	4.000	EAR.SENS.	METEOR.SEN	IR.SCAN
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
SPECTROM	MICROWAVE	10 SEC	400.0	150	20	65	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
120	80	95	200	350	920	1000	30	1030
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
EXO	LIQUID	HYDRAZINE	3-AXIS	SOLAR	CENTAUR	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

SYNCHRONOUS EARTH RESOURCES SA NEO-4

06/11/71

MISS. OBJ. TO DESIGN, DEVELOP AND OPERATE A SATELLITE SYSTEM FOR REMOTE SENSING OF THE EARTHS SURFACE AND THE LOWER REGIONS OF THE ATMOSPHERE FROM SYNCHRONOUS ORBITAL ALTITUDES.

PAYLOAD CURR.EXP.	PROGRAM N EAR OBS	AGENCY NASA	NO SATS 4	CHAR VELOC 3.9700E+04	CIRC ALTIT 1.9323E+04	NOM INCLIN 0.	NOM APOG 1.9323E+04	NOM PERIG 1.9323E+04
NOM ECCENT 0.	MAX APOG 1.9323E+04	MIN APOG 1.9323E+04	MAX PERIG 1.9323E+04	MIN PERIG 1.9323E+04	MAX INCLIN 0.	MIN INCLIN 0.	LCH WINDOW ...NONE...	LCH VEH 1 TIIIB
LCH SITE 1 ETR	IN LCH DAT 1981	FLTS 1979 0	FLTS 1980 0	FLTS 1981 1	FLTS 1982 2	FLTS 1983 1	FLTS 1984 0	FLTS 1985 0
FLTS 1986 0	FLTS 1987 1	FLTS 1988 2	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 7	SYS LF 2	MEAN MISS 2.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 75	LCH LENGTH 6.000	LCH DIAM 4.000	SENSOR 1 IR SCANNER	SENSOR 2 RADIOMETER	SENSOR 3 MICROWAVE
SENSOR 4 IMAG.SPEC.	SENSOR 5 SPRECTROM	POINT ACC 10 SEC	AV PWR 400.0	ST M V A W 150	ENV CONT W 20	GD NA ST W 65	PROPULS W 0	P PROPEL W 0
ATT CONT W 120	A.C.PROP. 80	TTC W 95	ELEC W 200	MISS EQ W 350	TOTAL D W 920	TO W IN EX 1000	ADAPTER W 30	LAUNCH W 1030
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK CENTAUR	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

EARTH PHYSICS SATELLITE NEO-5

06/11/71

MISS. OBJ. TO MAKE PRECISION MEASUREMENTS OF THE EARTHS LAND AND SEA AREAS TO DETERMINE -1- CONTINENTAL DRIFT, -2- MASS DISTRIBUTION, -3- SURFACE STRAIN, AND -4- VARIATION OF GRAVITY, SEA ALTITUDE, AND MASS.

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
CURR.EXP.	N EAR OBS	NASA	1	2.6600E+04	400.0	90.00	400.0	700.0
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
0.	400.0	400.0	400.0	400.0	103.0	80.00	...NONE...	TIIIC
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
WTR	1980	0	1	1	1	1	0	1
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
0	1	0	1	0	7	2	2.000	...NONE...
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
...NONE...	0.	0.	63	6.500	3.500	MICROWAVE	LASERS	IMAG.DISS
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
NO ENTRY	*NO ENTRY*	1 SEC	200.0	80	10	30	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
80	50	60	170	150	530	580	20	600
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
EXO	LIQUID	HYDRAZINE	3-AXIS	SOLAR	DELTA	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

MISS. OBJ. SYSTEM DEMONSTRATION OF THE 4TH GENERATION SERIES OF OPERATIONAL METEOROLOGICAL SATELLITE FOR DOC/ESSA.

PAYLOAD CURR.EXP.	PROGRAM N EAR OBS	AGENCY NASA	NO SATS 1	CHAR VELOC 2.7500E+04	CIRC ALTIT 700.0	NOM INCLIN 100.0	NOM APOG 700.0	NOM PERIG 700.0
NOM ECCENT 0.	MAX APOG 750.0	MIN APOG 650.0	MAX PERIG 750.0	MIN PERIG 650.0	MAX INCLIN 103.0	MIN INCLIN 97.00	LCH WINDOW ...NONE...	LCH VEH 1 TIIIC
LCH SITE 1 WTR	IN LCH DAT 1981	FLTS 1979 0	FLTS 1980 0	FLTS 1981 1	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 1
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 1	TOTAL FLTS 3	SYS LF 5	MEAN MISS 5.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 196	LCH LENGTH 10.00	LCH DIAM 5.000	SENSOR 1 RADIOMETER	SENSOR 2 SCAN.RADIO	SENSOR 3 TEMP.RADIO
SENSOR 4 *NO ENTRY*	SENSOR 5 *NO ENTRY*	POINT ACC ...NONE...	AV PWR 200.0	ST M V A W 200	ENV CONT W 20	GD NA ST W 65	PROPULS W 0	P PROPEL W 0
ATT CONT W 110	A.C.PROP. 80	TTC W 90	ELEC W 270	MISS EQ W 245	TOTAL D W 920	TO W IN EX 1000	ADAPTER W 30	LAUNCH W 1030
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK DELTA	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. OBSERVE GLOBAL CLOUDS, DAY AND NIGHT, CLOUD TOP HEIGHTS, HEAT BALANCE, VERTICAL TEMPERATURES AND WATER VAPOR PROFILES.

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
CURR.EXP.	OPERAT.SC.	NON NASA	3	2.7500E+04	700.0	100.0	700.0	700.0
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
0.0	700.0	700.0	700.0	700.0	103.0	97.00	...NONE...	TIIIC
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
WTR	1979	1	1	1	1	1	1	1
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
1	1	1	1	1	12	12	4.000	...NONE...
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
...NONE...	0.	0.	118	6.000	5.000	BOLOMETERS	TV CAMERA	VIDICON
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
NO ENTRY	*NO ENTRY*	...NONE...	200.0	200	20	60	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
110	80	90	270	250	920	1000	30	1030
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
EXO	LIQUID	HYDRAZINE	3-AXIS	SOLAR	DELTA	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

SYNCHRONOUS METEOROLOGICAL SAT NEO-8 06/11/71

MISS. OBJ. DEVELOP AND OPERATE A SYNCHRONOUS METEOROLOGICAL SATELLITE FOR DOC/ESSA.

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
CURR.EXP.	N EAR OPS	NASA	1	3.9700E+04	1.9323E+04	0.	1.9323E+04	1.9323E+04
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
0.	1.9323E+04	1.9323E+04	1.9323E+04	1.9323E+04	0.	0.	...NONE...	TIIIB
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
ETR	1982	0	0	0	1	1	0	0
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
0	0	0	0	0	2	2	2.000	...NONE...
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
...NONE...	0.	0.	157	8.000	5.000	VIS.SCANNR	IR SCANNR	ENVIR.MON.
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
DATA COLL	RELAY CAP.	10 SEC	300.0	160	30	70	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
140	90	100	250	250	910	1000	35	1035
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
EXO	LIQUID	HYDRAZINE	3-AXIS	SOLAR	CENTAUR	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

SYNCHRONOUS EARTH RESOURCES NEO-11 06/11/71

MISS. OBJ. OPERATIONAL REMOTE SENSING AND MEASUREMENT OF THE EARTHS RESOURCES AND LOWER ATMOSPHERE.

PAYLOAD CURR.EXP.	PROGRAM OPERAT.SC.	AGENCY NON NASA	NO SATS 4	CHAR VELOC 3.9700E+04	CIRC ALTIT 1.9323E+04	NOM INCLIN 0.	NOM APOG 1.9323E+04	NOM PERIG 1.9323E+04
NOM ECCENT 0.	MAX APOG 1.9323E+04	MIN APOG 1.9323E+04	MAX PERIG 1.9323E+04	MIN PERIG 1.9323E+04	MAX INCLIN 0.	MIN INCLIN 0.	LCH WINDOW *NO ENTRY*	LCH VEH 1 TIIIB
LCH SITE 1 ETR	IN LCH DAT 1985	FLTS 1979 0	FLTS 1980 0	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 4
FLTS 1986 0	FLTS 1987 0	FLTS 1988 4	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 8	SYS LF 6	MEAN MISS 3.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 170	LCH LENGTH 6.000	LCH DIAM 6.000	SENSOR 1 TV CAMERA	SENSOR 2 IR	SENSOR 3 MICROWAVE
SENSOR 4 RADAR	SENSOR 5 *NO ENTRY*	POINT ACC 10 SEC	AV PWR 400.0	ST M V A W 150	ENV CONT W 20	GD NA ST W 65	PROPULS W 0	P PROPEL W 0
ATT CONT W 120	A.C.PROP. 80	TTC W 95	ELEC W 200	MISS EQ W 350	TOTAL D W 920	TO W IN EX 1000	ADAPTER W 30	LAUNCH W 1030
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK CENTAUR	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. OPERATIONAL METEOROLOGICAL SATELLITE OPERATING FROM SYNCHRONOUS ALTITUDE FOR ESSA.

PAYLOAD CURR.EXP.	PROGRAM OPERAT.SC.	AGENCY NON NASA	NO SATS 2	CHAR VELOC 3.9700E+04	CIRC ALTIT 1.9323E+04	NOM INCLIN 0.	NOM APOG 1.9323E+04	NOM PERIG 1.9323E+04
NOM ECCENT 0.	MAX APOG 1.9323E+04	MIN APOG 1.9323E+04	MAX PERIG 1.9323E+04	MIN PERIG 1.9323E+04	MAX INCLIN 0.	MIN INCLIN 0.	LCH WINDOW *NO ENTRY*	LCH VEH 1 TIIIB
LCH SITE 1 FTR	IN LCH DAT 1979	FLTS 1979 1	FLTS 1980 1	FLTS 1981 1	FLTS 1982 1	FLTS 1983 1	FLTS 1984 1	FLTS 1985 1
FLTS 1986 1	FLTS 1987 1	FLTS 1988 1	FLTS 1989 1	FLTS 1990 1	TOTAL FLTS 12	SYS LF 12	MEAN MISS 2.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 157	LCH LENGTH 8.000	LCH DIAM 5.000	SENSOR 1 VIS.SCANNR	SENSOR 2 IR SCANNER	SENSOR 3 ENVIR.MON
SENSOR 4 DATA COLL	SENSOR 5 RELAY CAP.	POINT ACC 10 SEC	AV PWR 300.0	ST M V A W 160	ENV CONT W 30	GD NA ST W 70	PROPULS W 0	P PROPEL W 0
ATT CONT W 140	A.C.PROP. 90	TTC W 100	ELEC W 250	MISS EQ W 250	TOTAL D W 910	TO W IN EX 1000	ADAPTER W 35	LAUNCH W 1035
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK CENTAUR	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

POLAR EARTH RESOURCES NEO-16 06/11/71

MISS. OBJ. OPERATIONAL SATELLITE TO CONTINUALLY SURVEY EARTH RESOURCES AND TO PERFORM METEOROLOGICAL SURVEY WITH HIGH RESOLUTION SENSOR AND TRANSMITTING DATA TO EARTH.

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
CUPR.EXP.	OPERAT.SC.	NON NASA	4	2.6950E+04	500.0	100.0	500.0	500.0
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
0.	550.0	450.0	550.0	450.0	103.0	97.00	*NO ENTRY*	T9C
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
WTR	1979	4	0	4	0	4	0	4
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
0	0	0	6	0	22	12	2.000	...NONE...
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
...NONE...	0.	0.	339	12.00	6.000	IMAG.RADIO	IR RADIO	MICROWAVE
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
RAD.SCANNR	IR SCANNER	.04 DEG	600.0	370	60	200	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
240	160	180	600	850	2340	2500	90	2590
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
EXO	LIQUID	HYDRAZINE	3-AXIS	SOLAR	DELTA/364	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

POLAR ERS

NEO-17

06/11/71

MISS. OBJ. TO DESIGN, DEVELOP AND OPERATE A SPACE OBSERVATORY SYSTEM TO PERFORM METEOROLOGICAL AND EARTH RESOURCES SURVEYING BY ADVANCED REMOTE SENSING TECHNIQUES.

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
CURR.EXP.	N EAR OBS	NASA	4	2.6950E+04	500.0	100.0	500.0	500.0
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
0.	550.0	450.0	550.0	450.0	103.0	97.00	...NONE...	T9C
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
WTR	1985	0	0	0	0	0	0	0
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
2	4	0	0	0	6	2	2.000	...NONE...
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
...NONE...	0.	0.	1696	15.00	12.00	MICROWAVE	IR RADIO.	IR SCANNER
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
VIS.SCANNR	RADAR	.04 DEG	600.0	370	60	200	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
240	160	180	600	850	2340	2500	90	2590
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
EXO	LIQUID	HYDRAZINE	3-AXIS	SOLAR	DELTA/364	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

APPLICATION TECHNOLOGY SAT. NCN-1

06/11/71

MISS. OBJ. EARTH TO GEO-STATIONARY ORBIT COMMUNICATION POWER, HIGH GAIN MULTI-BEAM SATELLITE ANTENNA, GENERAL APPLICATION TECHNOLOGY(METEOROLOGY,EARTH OBSERVATIONS,ETC.)

PAYLOAD CURR.EXP.	PROGRAM N COM NAV	AGENCY NASA	NO SATS 1	CHAR VELOC 3.9700E+04	CIRC ALTIT 1.9323E+04	NOM INCLIN 0.	NOM APOG 1.9323E+04	NOM PERIG 1.9323E+04
NOM ECCENT 0.	MAX APOG 1.9323E+04	MIN APOG 1.9323E+04	MAX PERIG 1.9323E+04	MIN PERIG 1.9323E+04	MAX INCLIN 1.000	MIN INCLIN -1.000	LCH WINDOW *NO ENTRY*	LCH VEH 1 TIIIF
LCH SITE 1 ETR	IN LCH DAT 1979	FLTS 1979 1	FLTS 1980 0	FLTS 1981 1	FLTS 1982 0	FLTS 1983 1	FLTS 1984 1	FLTS 1985 0
FLTS 1986 1	FLTS 1987 0	FLTS 1988 1	FLTS 1989 1	FLTS 1990 0	TOTAL FLTS 7	SYS LF 5	MEAN MISS 5.000	TYPE MNT R MNT
EXP MNT PH REFUR/REP	MAX PLD VS 50.00	MIN PLD VS 10.00	LCH VOLUME 3711	LCH LENGTH 21.00	LCH DIAM 15.00	SENSOR 1 HF SENSOR	SENSOR 2 VHF SENSOR	SENSOR 3 ANTENNA
SENSOR 4 *NO ENTRY*	SENSOR 5 *NO ENTRY*	POINT ACC 0.05 DEG	AV PWR 8000	ST M V A W 1200	ENV CONT W 300	GD NA ST W 1000	PROPULS W 0	P PROPEL W 0
ATT CONT W 550	A.C.PROP. 400	TTC W 400	ELEC W 2900	MISS EQ W 1600	TOTAL D W 7550	TO W IN EX 7950	ADAPTER W 280	LAUNCH W 8230
TYPE ST ENDO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR NUC	TYPE KICK CENTAUR	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. TO DESIGN, DEVELOP, LAUNCH, AND OPERATE A SERIES OF SMALL R AND D SATELLITES FOR THE EXPERIMENTAL APPLICATION OF RESEARCH AND TECHNOLOGY DEVELOPMENTS IN SPACECRAFT AND SENSOR SUBSYSTEMS.

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
CURR.EXP.	N COM NAV	NASA	1	2.9400E+04	...NONE...	90.00	3000	300.0
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
0.	3000	3000	310.0	280.0	90.00	0.	*NO ENTRY*	TIIIC
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
WTR	1979	1	1	1	1	1	1	1
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
1	1	1	1	1	12	1	1.000	*NO ENTRY*
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
...NONE...	*NO ENTRY*	*NO ENTRY*	398	12.00	6.500	TV CAMERA	IR	LASER
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
CHG.COLL	NANO-G	10 SEC	500.0	115	10	25	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
90	60	60	150	150	540	600	20	620
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
ENDO	LIQUID	HYDRAZINE	3-AXIS	SOLAR	DELTA	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

SMALL APPLIC. TECHNOLOGY NCN-2B 06/11/71

MISS. OBJ. TO DESIGN,DEVELOP,LAUNCH,AND OPERATE A SERIES OF SMALL R AND D SATELLITES FOR THE EXPERIMENTAL APPLICATION OF RESEARCH AND TECHNOLOGY DEVELOPMENTS IN SPACECRAFT AND SENSOR SUBSYSTEMS.

PAYLOAD CURR.EXP.	PROGRAM N COM/NAV	AGENCY NASA	NO SATS 1	CHAR VELOC 3.9700E+04	CIRC ALTIT 1.9323E+04	NOM INCLIN 0.	NOM APOG 1.9323E+04	NOM PERIG 1.9323E+04
NOM ECCENT 0.	MAX APOG 1.9323E+04	MIN APOG 1.9323E+04	MAX PERIG 1.9323E+04	MIN PERIG 1.9323E+04	MAX INCLIN 0.	MIN INCLIN 0.	LCH WINDOW *NO ENTRY*	LCH VEH 1 TIIIB
LCH SITE 1 ETR	IN LCH DAT 1979	FLTS 1979 1	FLTS 1980 1	FLTS 1981 1	FLTS 1982 1	FLTS 1983 1	FLTS 1984 1	FLTS 1985 1
FLTS 1986 1	FLTS 1987 1	FLTS 1988 1	FLTS 1989 1	FLTS 1990 1	TOTAL FLTS 12	SYS LF 1	MEAN MISS 1.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS *NO ENTRY*	MIN PLD VS *NO ENTRY*	LCH VOLUME 398	LCH LENGTH 12.00	LCH DIAM 6.500	SENSOR 1 TV CAMERA	SENSOR 2 IR	SENSOR 3 LASER
SENSOR 4 CHG COLL.	SENSOR 5 NANO-G	POINT ACC 10 SEC	AV PWR 500.0	ST M V A W 115	ENV CONT W 10	GD NA ST W 25	PROPULS W *NO ENTRY*	P PROPEL W *NO ENTRY*
ATT CONT W 90	A.C.PROP. 60	TTC W 60	ELEC W 150	MISS EQ W 150	TOTAL D W 540	TO W IN EX 600	ADAPTER W 20	LAUNCH W 620
TYPE ST ENDO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK AGENA	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. COMMUNICATION SATELLITES TO BE FLOWN IN PARTNERSHIP WITH OTHER NATIONS WHO WILL PROVIDE CORRESPONDING TECHNICAL AND FUNDING ASSISTANC

PAYLOAD TURR.EXP.	PROGRAM N COM/NAV	AGENCY NASA	NO SATS 1	CHAR VELOC 3.9700E+04	CIRC ALTIT 1.9323E+04	NOM INCLIN 0.	NOM APOG 1.9323E+04	NOM PERIG 1.9323E+04
NOM ECCENT 0.	MAX APOG 1.9323E+04	MIN APOG 1.9323E+04	MAX PERIG 1.9323E+04	MIN PERIG 1.9323E+04	MAX INCLIN 1.9323E+04	MIN INCLIN 1.9323E+04	LCH WINDOW *NO ENTRY*	LCH VEH 1 TIIIB
LCH SITE 1 ETR	IN LCH DAT 1979	FLTS 1979 1	FLTS 1980 0	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 1	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 2	SYS LF 2	MEAN MISS 2.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS *NO ENTRY*	MIN PLD VS *NO ENTRY*	LCH VOLUME 398	LCH LENGTH 12.00	LCH DIAM 6.500	SENSOR 1 HF	SENSOR 2 VHF	SENSOR 3 SLD.ST.DET
SENSOR 4 *NO ENTRY*	SENSOR 5 *NO ENTRY*	POINT ACC 10 SEC	AV PWR 420.0	ST M V A W 120	ENV CONT W 20	GD NA ST W 50	PROPULS W 0	P PROPEL W 0
ATT CONT W 100	A.C.PROP. 70	TTC W 80	ELEC W 200	MISS EQ W 250	TOTAL D W 750	TO W IN EX 820	ADAPTER W 30	LAUNCH W 850
TYPE ST ENDO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK CENTAUR	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. ORJ. COMMUNICATION SATELLITES TO BE FLOWN IN PARTNERSHIP WITH OTHER NATIONS WHO WILL PROVIDE CORRESPONDING TECHNICAL AND FUNDING ASSISTANCE.

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
CURR.EXP.	N COM/NAV	NASA	1	2.9400E+04	...NONE...	90.00	3000	300.0
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
.2660	3000	3000	300.0	300.0	90.00	90.00	*NO ENTRY*	T3C
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
ETR	1982	0	0	0	1	0	0	0
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
0	0	0	1	0	2	2	2.000	...NONE...
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
...NONE...	*NO ENTRY*	*NO ENTRY*	398	12.00	6.500	HF	VHF	SLD.ST.DET
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
NO ENTRY	*NO ENTRY*	10 SEC	420.0	120	20	50	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
100	70	80	200	250	750	820	30	850
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
ENDO	LIQUID	HYDRAZINE	3-AXIS	SOLAR	DELTA	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

TRACKING AND DATA RELAY NCN-5 06/11/71

MISS. OBJ. DEVELOP AND OPERATE A COMMAND, TRACKING AND DATA RELAY OF LOW ORBITING SATELLITE FROM SYNCHRONOUS SATELLITE TO A FEW CENTRALLY LOCATED MISSION CONTROL CENTERS.

PAYLOAD CURR.EXP.	PROGRAM OPERAT.SCI	AGENCY NASA	NO SATS 3	CHAR VELOC 3.9700E+04	CIRC ALTIT 1.9323E+04	NOM INCLIN 0.	NOM APOG 1.9323E+04	NOM PERIG 1.9323E+04
NOM ECCENT 0.	MAX APOG 1.9323E+04	MIN APOG 1.9323E+04	MAX PERIG 1.9323E+04	MIN PERIG 1.9323E+04	MAX INCLIN 1.000	MIN INCLIN -1.000	LCH WINDOW *NO ENTRY*	LCH VEH 1 TIIIC
LCH SITE 1 ETR	IN LCH DAT 1979	FLTS 1979 1	FLTS 1980 2	FLTS 1981 1	FLTS 1982 0	FLTS 1983 2	FLTS 1984 1	FLTS 1985 0
FLTS 1986 0	FLTS 1987 2	FLTS 1988 1	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 10	SYS LF 12	MEAN MISS 3.000	TYPE MNT R MNT/R
EXP MNT PH MNT	MAX PLD VS 150.0	MIN PLD VS 10.00	LCH VOLUME 1335	LCH LENGTH 17.00	LCH DIAM 10.00	SENSOR 1 COMMUN	SENSOR 2 COMMAND	SENSOR 3 TRACKING
SENSOR 4 VHF	SENSOR 5 LASER	POINT ACC 0.1 DEG	AV PWR 680.0	ST M V A W 480	ENV CONT W 60	GD NA ST W 110	PROPULS W 0	P PROPEL W 0
ATT CONT W 400	A.G.PROP. 320	TTC W 0	ELEC W 650	MISS EQ W 600	TOTAL D W 1980	TO W IN EX 2300	ADAPTER W 80	LAUNCH W 2380
TYPE ST ENDO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C SPIN	TYPE EP SOLAR	TYPE KICK TRANSTAGE	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. PROVIDE OPERATIONAL SERVICES IN INFORMATION NETWORKS
NAVIGATION

PAYLOAD CURR.EXP.	PROGRAM OPERAT.SC	AGENCY NON NASA	NO SATS 3	CHAR VELOC 3.9700E+04	CIRC ALTIT 1.9323E+04	NOM INCLIN 0.	NOM APOG 1.9323E+04	NOM PERIG 1.9323E+04
NOM ECCENT 0.	MAX APOG 1.9323E+04	MIN APOG 1.9323E+04	MAX PERIG 1.000	MIN PERIG -1.000	MAX INCLIN 0.	MIN INCLIN 0.	LCH WINDOW *NO ENTRY*	LCH VEH 1 TIIIC
LCH SITE 1 ETR	IN LCH DAT 1979	FLTS 1979 2	FLTS 1980 1	FLTS 1981 1	FLTS 1982 0	FLTS 1983 2	FLTS 1984 1	FLTS 1985 1
FLTS 1986 0	FLTS 1987 0	FLTS 1988 2	FLTS 1989 1	FLTS 1990 0	TOTAL FLTS 11	SYS LF 12	MEAN MISS 5.000	TYPE MNT R MNT/R
EXP MNT PH MNT	MAX PLD VS 50.00	MIN PLD VS 10.00	LCH VOLUME 1400	LCH LENGTH 22.00	LCH DIAM 9.000	SENSOR 1 MULT.ANT.	SENSOR 2 TRNSPONDER	SENSOR 3 UHF
SENSOR 4 LASER	SENSOR 5 VHF	POINT ACC 0.2 DEG	AV PWR 585.0	ST M V A W 236	ENV CONT W 65	GO NA ST W 71	PROPULS W 0	P PROPEL W 0
ATT CONT W 335	A.C.PROP. 274	TTC W 51	ELEC W 307	MISS EQ W 355	TOTAL D W 1146	TO W IN EX 1420	ADAPTER W 70	LAUNCH W 1490
TYPE ST ENDO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C SPIN	TYPE EP SOLAR	TYPE KICK TRANSTAGE	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. PROVIDE OPERATIONAL SERVICES IN COMMUNICATION NETWORKS CABLE TV, BROADCAST TV, RADIO, TELEPHONE, TELETYPE, ETC.

PAYLOAD CURP.EXP.	PROGRAM OPERAT.SCI	AGENCY NON NASA	NO SATS 3	CHAR VELOC 3.9700E+04	CIRC ALTIT 1.9323E+04	NOM INCLIN 0.	NOM APOG 1.9323E+04	NOM PERIG 1.9300E+04
NOM ECCENT 1.9323E+04	MAX APOG 1.9323E+04	MIN APOG 1.9323E+04	MAX PERIG 1.9323E+04	MIN PERIG 1.9323E+04	MAX INCLIN 1.000	MIN INCLIN -1.000	LCH WINDOW *NO ENTRY*	LCH VEH 1 TIIID
LCH SITE 1 ETR	IN LCH DAT 1979	FLTS 1979 1	FLTS 1980 2	FLTS 1981 1	FLTS 1982 1	FLTS 1983 2	FLTS 1984 2	FLTS 1985 2
FLTS 1986 2	FLTS 1987 2	FLTS 1988 2	FLTS 1989 2	FLTS 1990 2	TOTAL FLTS 21	SYS LF 12	MEAN MISS 7.000	TYPE MNT R MNT/R
EXP MNT PH MNT	MAX PLD VS 200.0	MIN PLD VS 10.00	LCH VOLUME 4418	LCH LENGTH 25.00	LCH DIAM 15.00	SENSOR 1 MULT.ANT.	SENSOR 2 TRNSPONDER	SENSOR 3 UHF
SENSOR 4 VHF	SENSOR 5 LASER	POINT ACC 0.2 DEG	AV PWR 900.0	ST M V A W 700	ENV CONT W 125	GD NA ST W 150	PROPULS W 0	P PROPEL W 0
ATT CONT W 500	A.C.PROP. 400	TTC W 100	ELEC W 850	MISS EQ W 1000	TOTAL D W 3025	TO W IN EX 3425	ADAPTER W 120	LAUNCH W 3545
TYPE ST ENDO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C SPIN	TYPE EP SOLAR	TYPE KICK CENTAUR	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. PROVIDE OPERATIONAL SERVICES IN COMMUNICATION NETWORKS FOR SOUTH AMERICA,CANADA, AUSTRALIA, ESRO, SOUTH AFRICA, INDIA AND NEIGBORING COUNTRIES.

PAYLOAD CURR.EXP.	PROGRAM OPERAT.SC.	AGENCY NON NASA	NO SATS 2	CHAR VELOC 3.9700E+04	CIRC ALTIT 1.9323E+04	NOM INCLIN 0.	NOM APOG 1.9323E+04	NOM PERIG 1.9323E+04
NOM ECCENT 0.	MAX APOG 1.9323E+04	MIN APOG 1.9323E+04	MAX PERIG 1.9323E+04	MIN PERIG 1.9323E+04	MAX INCLIN 29.00	MIN INCLIN -1.000	LCH WINDOW *NO ENTRY*	LCH VEH 1 TIIIB
LCH SITE 1 ETR	IN LCH DAT 1980	FLTS 1979 0	FLTS 1980 2	FLTS 1981 6	FLTS 1982 2	FLTS 1983 2	FLTS 1984 0	FLTS 1985 0
FLTS 1986 4	FLTS 1987 5	FLTS 1988 2	FLTS 1989 1	FLTS 1990 2	TOTAL FLTS 26	SYS LF 11	MEAN MISS 5.000	TYPE MNT R MNT/R
EXP MNT PH MAINT	MAX PLD VS 25.00	MIN PLD VS 5.000	LCH VOLUME 151	LCH LENGTH 12.00	LCH DIAM 4.000	SENSOR 1 ANTENNA	SENSOR 2 TRNSMITTER	SENSOR 3 UHF
SENSOR 4 VHF	SENSOR 5 HF	POINT ACC .2 DEG	AV PWR 230.0	ST M V A W 200	ENV CONT W 25	GD NA ST W 65	PROPULS W 0	P PROPEL W 0
ATT CONT W 120	A.C.PROP. 90	TTC W 95	ELEC W 210	MISS EQ W 285	TOTAL D W 920	TO W IN EX 1000	ADAPTER W 30	LAUNCH W 1030
TYPE ST ENDO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C SPIN	TYPE EP SOLAR	TYPE KICK CENTAUR	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. DATA COLLECTION SATELLITE TO GATHER DATA FROM REMOTE MOBILE PLATFORM AND SCATTERED TRANSMITTERS AND CENTRALIZE THE OUTPUTS INTO A COMMON DATA CENTER.

PAYLOAD CURR.EXP.	PROGRAM OPERAT.SC	AGENCY NON NASA	NO SATS 1	CHAR VELOC 3.9450E+04	CIRC ALTIT 1.9300E+04	NOM INCLIN 5.000	NOM APOG 1.9300E+04	NOM PERIG 1.9300E+04
NOM ECCENT 0.	MAX APOG 1.9300E+04	MIN APOG 1.9300E+04	MAX PERIG 1.9300E+04	MIN PERIG 5.000	MAX INCLIN 5.000	MIN INCLIN *NO ENTRY*	LCH WINDOW *NO ENTRY*	LCH VEH 1 TIIIB
LCH SITE 1 ETR	IN LCH DAT 1979	FLTS 1979 1	FLTS 1980 0	FLTS 1981 1	FLTS 1982 0	FLTS 1983 1	FLTS 1984 0	FLTS 1985 1
FLTS 1986 0	FLTS 1987 1	FLTS 1988 0	FLTS 1989 1	FLTS 1990 0	TOTAL FLTS 6	SYS LF 12	MEAN MISS 5.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 157	LCH LENGTH 8.000	LCH DIAM 5.000	SENSOR 1 HF	SENSOR 2 VHF	SENSOR 3 UHF
SENSOR 4 COMMAND	SENSOR 5 TIMER	POINT ACC 0.5 DEG	AV PWR 200.0	ST M V A W 140	ENV CONT W 20	GD NA ST W 40	PROPULS W 0	P PROPEL W 0
ATT CONT W 100	A.C.PROP. 65	TTC W 75	ELEC W 190	MISS EQ W 135	TOTAL D W 635	TO W IN EX 700	ADAPTER W 25	LAUNCH W 725
TYPE ST ENDO	TYPE PROP LIQUID	TYPE PROPE GN2	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK AGENA	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. NAVIGATION DATA OVER OCEANS AND DOMESTIC AREAS.

PAYLOAD CURR.EXP.	PROGRAM OPERAT.SC.	AGENCY NON NASA	NO SATS 4	CHAR VELOC 3.9500E+04	CIRC ALTIT *NO ENTRY*	NOM INCLIN 29.00	NOM APOG 3.0000E+04	NOM PERIG 1.6000E+04
NOM ECCENT .2640	MAX APOG 3.0000E+04	MIN APOG 3.0000E+04	MAX PERIG 1.6000E+04	MIN PERIG 1.6000E+04	MAX INCLIN 29.00	MIN INCLIN 29.00	LCH WINDOW *NO ENTRY*	LCH VEH 1 TIIIB
LCH SITE 1 ETR	IN LCH DAT 1979	FLTS 1979 3	FLTS 1980 1	FLTS 1981 2	FLTS 1982 0	FLTS 1983 1	FLTS 1984 0	FLTS 1985 1
FLTS 1986 0	FLTS 1987 1	FLTS 1988 0	FLTS 1989 1	FLTS 1990 0	TOTAL FLTS 10	SYS LF 12	MEAN MISS 5.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 157	LCH LENGTH 8.000	LCH DIAM 5.000	SENSOR 1 HF	SENSOR 2 VHF	SENSOR 3 UHF
SENSOR 4 COMMAND	SENSOR 5 DETECTORS	POINT ACC 0.5	AV PWR 200.0	ST M V A W 140	ENV CONT W 20	GD NA ST W 40	PROPULS W 0	P PROPEL W 0
ATT CONT W 100	A.C.PROP. 65	TTC W 75	ELEC W 190	MISS EQ W 135	TOTAL D W 635	TO W IN EX 700	ADAPTER W 25	LAUNCH W 725
TYPE ST ENDO	TYPE PROP LIQUID	TYPE PROPE GN2	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK AGENA	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MEDICAL NETWORK SATELLITE NCN-11

06/11/71

MISS. OBJ. FACILITATE APPLICATIONS OF SPACE TECHNOLOGY AND SATELLITE SYSTEMS FOR MEDICAL DATA TRANSMISSION PURPOSES.

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
CURR.EXP.	N COM/NAV	NASA	2	3.9700E+04	1.9323E+04	0.	1.9323E+04	1.9323E+04
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
0.	1.9323E+04	1.9323E+04	1.9323E+04	1.9300E+04	0.	0.	*NO ENTRY*	TIIIC
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
ETR	1979	2	0	0	0	0	0	0
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
0	0	0	0	0	2	5	5.000	*NO ENTRY*
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
NO ENTRY	*NO ENTRY*	*NO ENTRY*	1696	15.00	12.00	UHF	VHF	HF
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
LASER	*NO ENTRY*	*NO ENTRY*	1000	400	50	150	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
210	140	150	490	550	1860	2000	70	2070
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
ENDO	LIQUID	HYDRAZINE	SPIN	SOLAR	TRANSTAGE	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

EDUCATION BROADCAST NCN-12 06/11/71

MISS. OBJ. FACILITATE APPLICATIONS OF SPACE TECHNOLOGY AND SATELLITE SYSTEMS FOR EDUCATIONAL BROADCAST PURPOSES.

PAYLOAD CURR.EXP.	PROGRAM N COM/NAV	AGENCY NASA	NO SATS 2	CHAR VELOC 3.9700E+04	CIRC ALTIT 1.9323E+04	NOM INCLIN 0.	NOM APOG 1.9323E+04	NOM PERIG 1.9323E+04
NOM ECCENT 0.	MAX APOG 1.9323E+04	MIN APOG 1.9323E+04	MAX PERIG 1.9323E+04	MIN PERIG 1.9323E+04	MAX INCLIN 0.	MIN INCLIN 0.	LCH WINDOW *NO ENTRY*	LCH VEH 1 TIIID
LCH SITE 1 ETR	IN LCH DAT 1980	FLTS 1979 0	FLTS 1980 2	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 2	SYS LF 5	MEAN MISS 5.000	TYPE MNT R MNT/R
EXP MNT PH MNT	MAX PLD VS *NO ENTRY*	MIN PLD VS *NO ENTRY*	LCH VOLUME 1963	LCH LENGTH 25.00	LCH DIAM 10.00	SENSOR 1 UHF	SENSOR 2 LASER	SENSOR 3 VHF
SENSOR 4 HF	SENSOR 5 *NO ENTRY*	POINT ACC 0.2	AV PWR 2000	ST M V A W 500	ENV CONT W 90	GD NA ST W 320	PROPULS W 0	P PROPEL W 0
ATT CONT W 300	A.C.PROP. 200	TTC W 200	ELEC W 990	MISS EQ W 1000	TOTAL D W 3200	TO W IN EX 3400	ADAPTER W 120	LAUNCH W 3520
TYPE ST ENDO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C SPIN	TYPE EP SOLAR	TYPE KICK CENTAUR	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. SYSTEM DEMONSTRATION SATELLITES FOR LAW ENFORCEMENT,
AIR TRAFFIC CONTROL, LAND TRAFFIC CONTROL TYPE MISSIONS.

PAYLOAD CURR.EXP.	PROGRAM N COM/NAV	AGENCY NASA	NO SATS 2	CHAR VELOC 3.9700E+04	CIRC ALTIT 1.9323E+04	NOM INCLIN 0.	NOM APOG 1.9323E+04	NOM PERIG 1.9323E+04
NOM ECCENT 0.	MAX APOG 1.9323E+04	MIN APOG 1.9323E+04	MAX PERIG 1.9323E+04	MIN PERIG 1.9323E+04	MAX INCLIN 0.	MIN INCLIN 0.	LCH WINDOW *NO ENTRY*	LCH VEH 1 TIIIC
LCH SITE 1 ETR	IN LCH DAT 1981	FLTS 1979 0	FLTS 1980 0	FLTS 1981 2	FLTS 1982 2	FLTS 1983 2	FLTS 1984 2	FLTS 1985 2
FLTS 1986 2	FLTS 1987 2	FLTS 1988 2	FLTS 1989 2	FLTS 1990 2	TOTAL FLTS 20	SYS LF 5	MEAN MISS 5.000	TYPE MNT R MNT/R
EXP MNT PH REFURB.	MAX PLD VS *NO ENTPY*	MIN PLD VS *NO ENTRY*	LCH VOLUME 1696	LCH LENGTH 15.00	LCH DIAM 12.00	SENSOR 1 COMM.	SENSOR 2 NAVIG.	SENSOR 3 DATA REL
SENSOR 4 EARTH RES.	SENSOR 5 *NO ENTRY*	POINT ACC .2 DEG	AV PWR 1000	ST M V A W 400	ENV CONT W 50	GD NA ST W 175	PROPULS W 0	P PROPEL W 0
ATT CONT W 380	A.C.PROP. 300	TTC W 170	ELEC W 510	MISS EQ W 315	TOTAL D W 1700	TO W IN EX 2000	ADAPTER W 70	LAUNCH W 2070
TYPE ST ENDO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK TRANSTAGE	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MARS VIKING NPL-1 06/11/71

MISS. OBJ. TO PROVIDE INFORMATION REGARDING THE POSSIBLE EXISTENCE AND NATURE OF LIFE ON MARS, THE ATMOSPHERIC AND SURFACE CHARACTERISTICS OF THE PLANET, AND THE NATURE OF THE PLANETARY ENVIRONMENT.

PAYLOAD CURR.EXP.	PROGRAM N PLANTARY	AGENCY NASA	NO SATS 1	CHAR VELOC 4.1000E+04	CIRC ALTIT PLANETARY	NOM INCLIN PLANETARY	NOM APOG PLANETARY	NOM PERIG PLANETARY
NOM ECCENT PLANETARY	MAX APOG PLANETARY	MIN APOG PLANETARY	MAX PERIG PLANETARY	MIN PERIG PLANETARY	MAX INCLIN PLANETARY	MIN INCLIN PLANETARY	LCH WINDOW 20 DAYS	LCH VEH 1 TIIID
LCH SITE 1 ETR	IN LCH DAT 1979	FLTS 1979 1	FLTS 1980 0	FLTS 1981 1	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 2	SYS LF 1	MEAN MISS 1.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 942	LCH LENGTH 12.00	LCH DIAM 10.00	SENSOR 1 M.SPECTR.	SENSOR 2 DNSTY GAUG	SENSOR 3 WIND VEL.
SENSOR 4 TEMP.SENS.	SENSOR 5 SOIL SMPLR	POINT ACC 1 DEG	AV PWR 800.0	ST M V A W 518	ENV CONT W 37	GD NA ST W 85	PROPULS W 3780	P PROPEL W 3285
ATT CONT W 42	A.C.PROP. 20	TTC W 122	ELEC W 428	MISS EQ W 2558	TOTAL D W 4265	TO W IN EX 7570	ADAPTER W 150	LAUNCH W 7720
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK CENTAUR	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. MEASURE PLANET MAGNETOSPHERE, MAGNETOSHEATH, DETACHED BOW SHOCK WAVE, AND TAIL AND WAKE REGION. INVESTIGATE INTERNAL COMPOSITION, STRUCTURE AND MAGNETIC FIELD.

PAYLOAD CURR.EXP.	PROGRAM N PLANTARY	AGENCY NASA	NO SATS 1	CHAR VELOC 3.9000E+04	CIRC ALTIT PLANETARY	NOM INCLIN PLANETARY	NOM APOG 2.1600E+04	NOM PERIG 530.0
NOM ECCENT .7260	MAX APOG PLANETARY	MIN APOG PLANETARY	MAX PERIG PLANETARY	MIN PERIG PLANETARY	MAX INCLIN PLANETARY	MIN INCLIN PLANETARY	LCH WINDOW 20 DAYS	LCH VEH 1 TIIIB
LCH SITE 1 ETR	IN LCH DAT 1980	FLTS 1979 0	FLTS 1980 1	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 1	SYS LF 1	MEAN MISS 1.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 236	LCH LENGTH 12.00	LCH DIAM 5.000	SENSOR 1 PART.CTRS	SENSOR 2 MAGNETOMTR	SENSOR 3 ION+E.PRBS
SENSOR 4 GEIGER CTR	SENSOR 5 CHARGE COL	POINT ACC 1 DEG	AV PWR 300.0	ST M V A W 100	ENV CONT W 20	GD NA ST W 30	PROPULS W 450	P PROPEL W 380
ATT CONT W 110	A.C.PROP. 70	TTC W 70	ELEC W 140	MISS EQ W 50	TOTAL D W 520	TO W IN EX 970	ADAPTER W 30	LAUNCH W 1000
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C SPIN	TYPE EP SOLAR	TYPE KICK AGENA	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

VENUS RADAR MAPPING NPL-6 06/11/71

MISS. OBJ. DETAILED SURFACE MAPPING OF VENUS TO A RESOLUTION OF 50 METERS, USING RADAR IMAGING.

PAYLOAD CURR.EXP.	PROGRAM N PLANTARY	AGENCY NASA	NO SATS 1	CHAR VELOC 3.9000E+04	CIRC ALTIT PLANETARY	NOM INCLIN PLANETARY	NOM APOG PLANETARY	NOM PERIG PLANETARY
NOM ECCENT PLANETARY	MAX APOG PLANETARY	MIN APOG PLANETARY	MAX PERIG PLANETARY	MIN PERIG PLANETARY	MAX INCLIN PLANETARY	MIN INCLIN PLANETARY	LCH WINDOW 20 DAYS	LCH VEH 1 TIIID
LCH SITE 1 ETR	IN LCH DAT 1982	FLTS 1979 0	FLTS 1980 0	FLTS 1981 0	FLTS 1982 1	FLTS 1983 0	FLTS 1984 0	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 1	SYS LF 2	MEAN MISS 2.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 942	LCH LENGTH 12.00	LCH DIAM 10.00	SENSOR 1 SIDE RADAR	SENSOR 2 CHARGE COL	SENSOR 3 IR
SENSOR 4 OPTICS	SENSOR 5 VIDICON	POINT ACC 0.1 DEG	AV PWR 1000	ST M V A W 318	ENV CONT W 60	GD NA ST W 50	PROPULS W 6370	P PROPEL W 5700
ATT CONT W 49	A.C.PROP. 29	TTC W 180	ELEC W 287	MISS EQ W 322	TOTAL D W 1907	TO W IN EX 7636	ADAPTER W 264	LAUNCH W 7900
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK CENTAUR	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. ANALYSIS OF SURFACE PROPERTIES AND ENVIRONMENT ON VENUS. MEASUREMENT OF ATMOSPHERIC PROPERTIES DURING DESCENT. SURFACE MAPPING BY ORBITER.

PAYLOAD CURR.EXP.	PROGRAM N PLANTARY	AGENCY NASA	NO SATS 1	CHAR VELOC 3.9000E+04	CIRC ALTIT PLANETARY	NOM INCLIN PLANETARY	NOM APOG PLANETARY	NOM PERIG PLANETARY
NOM ECCENT PLANETARY	MAX APOG PLANETARY	MIN APOG PLANTARY	MAX PERIG PLANETARY	MIN PERIG PLANETARY	MAX INCLIN PLANETARY	MIN INCLIN PLANETARY	LCH WINDOW 20 DAYS	LCH VEH 1 TIIID
LCH SITE 1 ETR	IN LCH DAT 1985	FLTS 1979 0	FLTS 1980 0	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 1
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 1	SYS LF 1	MEAN MISS 1.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 1963	LCH LENGTH 25.00	LCH DIAM 10.00	SENSOR 1 SOIL ASSAY	SENSOR 2 MASS SPECT	SENSOR 3 PRES.GAUGE
SENSOR 4 NANO ACCEL	SENSOR 5 TV CAMERA	POINT ACC 1 DEG	AV PWR 700.0	ST M V A W 450	ENV CONT W 35	GD NA ST W 85	PROPULS W 5600	P PROPEL W 5000
ATT CONT W 40	A.C.PROP. 20	TTC W 100	ELEC W 350	MISS EQ W 600	TOTAL D W 2240	TO W IN EX 7260	ADAPTER W 160	LAUNCH W 7420
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK CENTAUR	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EC R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

VENUS EXPLORER LANDER-2ND NPL-8 06/11/71

MISS. OBJ. ORBITING MICROWAVE AND IR SPECTRAL INSTRUMENTS FOR SURFACE, ATMOSPHERE AND CLOUD STUDIES. LANDED SEISMOMETER, XRAY DIFFRACTION, COMPOSITION MEASUREMENT, ENVIRONMENTAL DYNAMICS,

PAYLOAD CURR.EXP.	PROGRAM N PLANTARY	AGENCY NASA	NO SATS 1	CHAR VELOC 3.9000E+04	CIRC ALTIT PLANETARY	NOM INCLIN PLANETARY	NOM APOG PLANETARY	NOM PERIG PLANETARY
NOM ECCENT PLANETARY	MAX APOG PLANETARY	MIN APOG PLANETARY	MAX PERIG PLANETARY	MIN PERIG PLANETARY	MAX INCLIN PLANETARY	MIN INCLIN PLANETARY	LCH WINDOW 20 DAYS	LCH VEH 1 TIIID
LCH SITE 1 ETR	IN LCH DAT 1988	FLTS 1979 0	FLTS 1980 0	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 1	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 1	SYS LF 1	MEAN MISS 1.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 1963	LCH LENGTH 25.00	LCH DIAM 10.00	SENSOR 1 SOIL ASSAY	SENSOR 2 PRES.GAGE	SENSOR 3 RADAR
SENSOR 4 TV CAMERA	SENSOR 5 IR	POINT ACC 1 DEG	AV PWR 600.0	ST M V A W 350	ENV CONT W 30	GD NA ST W 70	PROPULS W 2550	P PROPEL W 2200
ATT CONT W 40	A.C.PROP. 20	TTC W 100	ELEC W 300	MISS EQ W 1210	TOTAL D W 2430	TO W IN EX 4650	ADAPTER W 100	LAUNCH W 4750
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK CENTAUR	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. OBTAIN FIRST-GENERATION FLYBY DATA OF URANUS AND NEPTUNE. CORRELATE SPATIAL EFFECTS IN COSMIC FLUX AND SOLAR WIND WITH JSP MISSION.

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
CURR.EXP.	N PLANTARY	NASA	2	5.1500E+04	PLANETARY	PLANETARY	PLANETARY	PLANETARY
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
PLANETARY	PLANETARY	PLANETARY	PLANETARY	PLANETARY	PLANETARY	PLANETARY	20 DAYS	TIIIF
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
ETR	1979	2	0	0	0	0	0	0
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
0	0	0	0	0	2	9	9.000	...NONE...
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
...NONE...	0.	0.	942	12.00	10.00	CHG.PART	MAGNETOMET	EL FIELD
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
TV CAMERA	IR	1 DEG	439.0	245	42	85	94	74
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
107	67	172	374	361	1339	1480	32	1512
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
EXO	LIQUID	HYDRAZINE	3-AXIS	RTG	CENT/BUR2	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

MISS. OBJ. MEASURE PARTICLES AND FIELD ENVIRONMENT TO 5 AU, PARTICLE DENSITY OF ASTEROID BELT, MAGNETIC AND RADIATION FIELDS OF JUPITER, AND TO PROVIDE JUPITER IMAGING.

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
CURR.EXP.	N PLANTARY	NASA	2	4.8300E+04	PLANETARY	PLANETARY	PLANETARY	PLANETARY
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
PLANETARY	PLANETARY	PLANETARY	PLANETARY	PLANETARY	PLANETARY	PLANETARY	20 DAYS	TIIID
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
ETR	1982	0	0	0	2	0	0	0
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
0	0	0	0	0	2	2	2.000	...NONE...
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
...NONE...	0.	0.	1178	15.00	10.00	CHG PART	CHG COL	MAGNETOMET
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
EL FIELD	TV CAMERA	1 DEG	300.0	100	20	30	390	325
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
110	70	70	130	50	505	900	30	930
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
EXO	LIQUID	HYDRAZINE	3-AXIS	RTG	CENTAUR	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

MISS. OBJ. MONITOR PARTICLES AND FIELD ENVIRONMENT, MEASURE RING COMPOSITION, AND ATMOSPHERIC CHARACTERISTICS AND PROFILES.

PAYLOAD CURR.EXP.	PROGRAM N PLANTARY	AGENCY NASA	NO SATS 1	CHAR VELOC 4.8300E+04	CIRC ALTIT PLANETARY	NOM INCLIN PLANETARY	NOM APOG 2.6400E+06	NOM PERIG 1.5000E+05
NOM ECCENT PLANETARY	MAX APOG PLANETARY	MIN APOG PLANETARY	MAX PERIG PLANETARY	MIN PERIG PLANETARY	MAX INCLIN PLANETARY	MIN INCLIN PLANETARY	LCH WINDOW 20 DAYS	LCH VEH 1 TIIIF
LCH SITE 1 ETR	IN LCH DAT 1985	FLTS 1979 0	FLTS 1980 0	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 1
FLTS 1986 0	FLTS 1987 1	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 2	SYS LF 3	MEAN MISS 3.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 1178	LCH LENGTH 15.00	LCH DIAM 10.00	SENSOR 1 UV	SENSOR 2 IR	SENSOR 3 VISIBLE
SENSOR 4 RADAR	SENSOR 5 MAGNETOMET	POINT ACC 1 DEG	AV PWR 450.0	ST M V A W 315	ENV CONT W 40	GD NA ST W 85	PROPULS W 1750	P PROPEL W 1500
ATT CONT W 110	B.C.PROP. 70	TTC W 170	ELEC W 380	MISS EQ W 330	TOTAL D W 1610	TO W IN EX 3180	ADAPTER W 110	LAUNCH W 3290
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP RTG	TYPE KICK CENT/BUR2	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. MAPPING, COMPOSITION ANALYSIS, AND TIME DEPENDENT MEASUREMENTS OF THE ATMOSPHERE. DETERMINE THE EXTENT AND INTENSITY OF PLANETARY FIELDS.

PAYLOAD CURR.EXP.	PROGRAM N PLANTARY	AGENCY NASA	NO SATS 1	CHAR VELOC 4.9600E+04	CIRC ALTIT PLANETARY	NOM INCLIN PLANETARY	NOM APOG PLANETARY	NOM PERIG PLANETARY
NOM ECCENT PLANETARY	MAX APOG PLANETARY	MIN APOG PLANETARY	MAX PERIG PLANETARY	MIN PERIG PLANETARY	MAX INCLIN PLANETARY	MIN INCLIN PLANETARY	LCH WINDOW 20 DAYS	LCH VEH 1 TIIIF
LCH SITE 1 ETR	IN LCH DAT 1986	FLTS 1979 0	FLTS 1980 0	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 0
FLTS 1986 1	FLTS 1987 0	FLTS 1988 0	FLTS 1989 1	FLTS 1990 0	TOTAL FLTS 2	SYS LF 7	MEAN MISS 7.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 1178	LCH LENGTH 15.00	LCH DIAM 10.00	SENSOR 1 MAGNETOMET	SENSOR 2 EL FIELD	SENSOR 3 CHG PART
SENSOR 4 IR	SENSOR 5 VISIBLE	POINT ACC 1 DEG	AV PWR 450.0	ST M V A W 315	ENV CONT W 40	GD NA ST W 85	PROPULS W 1750	P PROPEL W 1500
ATT CONT W 110	A.C.PROP. 70	TTC W 170	ELEC W 380	MISS EQ W 730	TOTAL D W 2010	TO W IN EX 3580	ADAPTER W 120	LAUNCH W 3700
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP RTG	TYPE KICK CENT/BII	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

ASTEROID SURVEY NPL-15 06/11/71

MISS. OBJ. DEFINE MICROMETEOROID, PARTICLE AND FIELD ENVIRONMENT IN ASTEROID BELT. PROVE SOLAR ELECTRIC PROPULSION OVER LONG DURATION.

PAYLOAD CURR.EXP.	PROGRAM N PLANTARY	AGENCY NASA	NO SATS 1	CHAR VELOC 3.9000E+04	CIRC ALTIT 3 AU HELIO	NOM INCLIN PLANETARY	NOM APOG 2.4210E+08	NOM PERIG 2.4210E+08
NOM ECCENT PLANETARY	MAX APOG PLANETARY	MIN APOG PLANETARY	MAX PERIG PLANETARY	MIN PERIG PLANETARY	MAX INCLIN PLANETARY	MIN INCLIN PLANETARY	LCH WINDOW 180 DAYS	LCH VEH 1 TIIIC
LCH SITE 1 ETR	IN LCH DAT 1984	FLTS 1979 0	FLTS 1980 0	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 1	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 1	SYS LF 4	MEAN MISS 4.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 1571	LCH LENGTH 20.00	LCH DIAM 10.00	SENSOR 1 MICROMTRID	SENSOR 2 EL.FIELD	SENSOR 3 M.SPECTR.
SENSOR 4 RADAR	SENSOR 5 CHG PART	POINT ACC 1 DEG	AV PWR 6500	ST M V A W 114	ENV CONT W 41	GD NA ST W 53	PROPULS W 780	P PROPEL W 240
ATT CONT W 33	A.C.PROP. 7	TTC W 149	ELEC W 390	MISS EQ W 280	TOTAL D W 1593	TO W IN EX 1840	ADAPTER W 60	LAUNCH W 1900
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE MERCURY	TYPE A C SPIN	TYPE EP SOLAR	TYPE KICK TRANSTAGE	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. CLOSE RANGE, LONG DURATION EXAMINATION OF COMET. DETERMINE PHYSICAL STATE, STRUCTURE, COMPOSITION AND MODE OF INTERACTION WITH THE INTERPLANETARY ENVIRONMENT.

PAYLOAD CURR.EXP.	PROGRAM N PLANTARY	AGENCY NASA	NO SATS 1	CHAR VELOC 3.9000E+04	CIRC ALTIT 3 AU HELIO	NOM INCLIN PLANETARY	NOM APOG 2.4210E+08	NOM PERIG 2.4210E+08
NOM ECCENT PLANETARY	MAX APOG PLANETARY	MIN APOG PLANETARY	MAX PERIG PLANETARY	MIN PERIG PLANETARY	MAX INCLIN PLANETARY	MIN INCLIN PLANETARY	LCH WINDOW 20 DAYS	LCH VEH 1 TIIID
LCH SITE 1 ETR	IN LCH DAT 1982	FLTS 1979 0	FLTS 1980 0	FLTS 1981 0	FLTS 1982 1	FLTS 1983 0	FLTS 1984 0	FLTS 1985 1
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 2	SYS LF 4	MEAN MISS 4.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 1571	LCH LENGTH 20.00	LCH DIAM 10.00	SENSOR 1 TV CAMERA	SENSOR 2 M.SPECTR	SENSOR 3 THERMAL
SENSOR 4 RADAR	SENSOR 5 IR	POINT ACC 0.5 DEG	AV PWR 500.0	ST M V A W 400	ENV CONT W 50	GD NA ST W 200	PROPULS W 0	P PROPEL W 0
ATT CONT W 220	A.C.PROP. 150	TTC W 150	ELEC W 320	MISS EQ W 660	TOTAL D W 1850	TO W IN EX 2000	ADAPTER W 70	LAUNCH W 2070
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK CENT/NE	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAR U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. THE EXPLORATION OF MARS AND THE RETURN OF PHYSICAL SAMPLES OF THE PLANETARY SURFACE TO EARTH. ORBITER/BUS VEHICLE.

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
CUPR.EXP.	N PLANTARY	NASA	1	4.1000E+04	MARS ORBIT	PLANETARY	540.0	540.0
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
PLANETARY	PLANETARY	PLANETARY	PLANETARY	PLANETARY	PLANETARY	PLANETARY	20 DAYS	TIIIF
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
ETR	1990	0	0	0	0	0	0	0
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
0	0	0	0	1	1	3	3.000	...NONE...
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
...NONE...	0.	0.	2463	16.00	14.00	M.SPECTR	PRESS.GAUG	SOIL ASSAY
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
X-RAY	RADAR	.5 DEG	1.5000E+04	2905	140	260	3070	2548
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
385	325	440	710	2380	7417	10290	310	10600
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
EXO	LIQUID	BI PROP	3-AXIS	SOLAR	CENTAUR	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

MARS SAMPLE RETURN LANDER-B NPL-20 06/11/71

MISS. OBJ. THE EXPLORATION OF MARS AND THE RETURN OF PHYSICAL SAMPLES OF THE PLANETARY SURFACE TO EARTH. LANDER/RETURN PROBE.

PAYLOAD CURR.EXP.	PROGRAM N PLANTARY	AGENCY NASA	NO SATS 1	CHAR VELOC 4.1000E+04	CIRC ALTIT MARS ORBIT	NOM INCLIN PLANETARY	NOM APOG 540.0	NOM PERIG 540.0
NOM ECCENT PLANETARY	MAX APOG PLANETARY	MIN APOG PLANETARY	MAX PERIG PLANETARY	MIN PERIG PLANETARY	MAX INCLIN PLANETARY	MIN INCLIN PLANETARY	LCH WINDOW 20 DAYS	LCH VEH 1 TIIIF
LCH SITE 1 ETR	IN LCH DAT 1990	FLTS 1979 0	FLTS 1980 0	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 1	TOTAL FLTS 1	SYS LF 3	MEAN MISS 3.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 3541	LCH LENGTH 23.00	LCH DIAM 14.00	SENSOR 1 M.SPECTR	SENSOR 2 PRESS.GAUG	SENSOR 3 SOIL ASSAY
SENSOR 4 X-RAY	SENSOR 5 RADAR	POINT ACC .5 DEG	AV PWR 1.5000E+04	ST M V A W 480	ENV CONT W 40	GD NA ST W 0	PROPULS W 1885	P PROPEL W 1540
ATT CONT W 140	A.C.PROP. 50	TTC W 260	ELEC W 960	MISS EQ W 7290	TOTAL D W 9465	TO W IN EX 11055	ADAPTER W 345	LAUNCH W 11400
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE BI PROP	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK CENTAUR	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

GENERAL SCIENTIFIC RESEARCH NSO-1 06/11/71

MISS. OBJ. PROVIDE MANNED RESEARCH MODULE TO CONDUCT ASTRONOMY, SPACE PHYSICS, LIFE SCIENCE, AND/OR CONTAMINATION MONITORING EXPERIMENTS WHILE ATTACHED TO SHUTTLE.

PAYLOAD CURR.EXP.	PROGRAM N SORTIE	AGENCY NASA	NO SATS 1	CHAR VELOC 2.5900E+04	CIRC ALTIT 200.0	NOM INCLIN 55.00	NOM APOG 200.0	NOM PERIG 200.0
NOM ECCENT 0.	MAX APOG 200.0	MIN APOG 200.0	MAX PERIG 200.0	MIN PERIG 200.0	MAX INCLIN 90.00	MIN INCLIN 55.00	LCH WINDOW ...NONE...	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1981	FLTS 1979 0	FLTS 1980 0	FLTS 1981 2	FLTS 1982 3	FLTS 1983 4	FLTS 1984 4	FLTS 1985 3
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 16	SYS LF 5	MEAN MISS 4.0000E-02	TYPE MNT R REF/MAINT
EXP MNT PH EVA/IVA	MAX PLD VS ....NA....	MIN PLD VS ....NA....	LCH VOLUME 8313	LCH LENGTH 54.00	LCH DIAM 14.00	SENSOR 1 ASTRONOMY	SENSOR 2 PHYSICS	SENSOR 3 LIFE SCI.
SENSOR 4 MAN	SENSOR 5 *NO ENTRY*	POINT ACC 0.5 DEG	AV PWR 1.0000E+04	ST M V A W 8745	ENV CONT W 4705	GD NA ST W 0	PROPULS W 0	P PROPEL W 0
ATT CONT W 0	A.C.PROP. 0	TTC W 275	ELEC W 3200	MISS EQ W 10575	TOTAL D W 27500	TO W IN EX 27500	ADAPTER W 0	LAUNCH W 27500
TYPE ST EXO	TYPE PROP ...NONE...	TYPE PROPE ...NONE...	TYPE A C ...NONE...	TYPE EP FUEL CELL	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. PROVIDE RESEARCH MODULE FOR MAN TO CONDUCT EARTH OBSERVATIONS, COMMUNICATIONS AND NAVIGATIONS, AND/OR MATERIAL SCIENCE EXPERIMENTS WHILE ATTACHED TO THE SHUTTLE.

PAYLOAD CURR.EXP.	PROGRAM N SORTIE	AGENCY NASA	NO SATS 1	CHAR VELOC 2.5600E+04	CIRC ALTIT 100.0	NOM INCLIN 65.00	NOM APOG 100.0	NOM PERIG 100.0
NOM ECCENT 0.	MAX APOG 122.0	MIN APOG 98.00	MAX PERIG 122.0	MIN PERIG 98.00	MAX INCLIN 90.00	MIN INCLIN 65.00	LCH WINDOW ...NONE...	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1981	FLTS 1979 0	FLTS 1980 0	FLTS 1981 2	FLTS 1982 3	FLTS 1983 2	FLTS 1984 3	FLTS 1985 2
FLTS 1986 3	FLTS 1987 0	FLTS 1988 3	FLTS 1989 1	FLTS 1990 0	TOTAL FLTS 19	SYS LF 9	MEAN MISS 4.0000E-02	TYPE MNT R REF/MAINT
EXP MNT PH EVA/IVA	MAX PLD VS ....NA....	MIN PLD VS ....NA....	LCH VOLUME 7851	LCH LENGTH 51.00	LCH DIAM 14.00	SENSOR 1 EARTH OBS.	SENSOR 2 COMMUN.	SENSOR 3 NAVIG.
SENSOR 4 MTRL.SCI.	SENSOR 5 MAN	POINT ACC 0.5	AV PWR 1.0000E+04	ST M V A W 8745	ENV CONT W 4705	GD NA ST W 0	PROPULS W 0	P PROPEL W 0
ATT CONT W 0	A.C.PROF. 0	TTC W 275	ELEC W 3200	MISS EQ W 13075	TOTAL D W 30000	TO W IN EX 30000	ADAPTER W 0	LAUNCH W 30000
TYPE ST EXO	TYPE PROP ...NONE...	TYPE PROPE ...NONE...	TYPE A C ...NONE...	TYPE EP FUEL CELL	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. PROVIDE A DEDICATED RESEARCH MODULE FOR MAN TO CONDUCT EARTH OBSERVATIONS, COMMUNICATIONS AND NAVIGATIONS, AND/OR MATERIAL SCIENCE EXPERIMENTS.

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
CURR.EXP.	N SORTIE	NASA	1	2.5900E+04	200.0	55.00	200.0	200.0
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
0.	200.0	200.0	200.0	200.0	90.00	55.00	...NONE...	SHUTTLE
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
ETR	1984	0	0	0	0	0	1	3
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
4	5	4	5	5	27	7	4.0000E-02	REF/MAINT
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
EVA/IVA	....NA....	....NA....	8313	54.00	14.00	ASTRONOMY	EARTH OBS	MAN
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
NO ENTRY	*NO ENTRY*	0.5	1.0000E+04	8745	4705	0	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
0	0	275	3200	12575	29500	29500	0	29500
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
EXO	...NONE...	...NONE...	...NONE...	FUEL CELL	...NONE...	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

MISS. OBJ. PROVIDE MODULE FOR MAN TO CONDUCT SHORT-TERM EARTH OBSERVATIONS WHILE ATTACHED TO THE SHUTTLE.

PAYLOAD CURR.EXP.	PROGRAM N SORTIE	AGENCY NASA	NO SATS 1	CHAR VELOC 2.5600E+04	CIRC ALTIT 100.0	NOM INCLIN 75.00	NOM APOG 100.0	NOM PERIG 100.0
NOM ECCENT 0.	MAX APOG 100.0	MIN APOG 100.0	MAX PERIG 100.0	MIN PERIG 100.0	MAX INCLIN 90.00	MIN INCLIN 75.00	LCH WINDOW ...NONE...	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1984	FLTS 1979 0	FLTS 1980 0	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 2	FLTS 1985 2
FLTS 1986 2	FLTS 1987 2	FLTS 1988 2	FLTS 1989 3	FLTS 1990 4	TOTAL FLTS 17	SYS LF 7	MEAN MISS 4.0000E-02	TYPE MNT R REF/MAINT
EXP MNT PH EVA/IVA	MAX PLD VS ....NA....	MIN PLD VS ....NA....	LCH VOLUME 6311	LCH LENGTH 41.00	LCH DIAM 14.00	SENSOR 1 EARTH OBS.	SENSOR 2 ASTRONOMY	SENSOR 3 MAN
SENSOR 4 *NO ENTRY*	SENSOR 5 *NO ENTRY*	POINT ACC 0.5 DEG	AV PWR 1.0000E+04	ST M V A W 8120	ENV CONT W 4705	GD NA ST W 0	PROPULS W 0	P PROPEL W 0
ATT CONT W 0	A.C.PROP. 0	TTC W 275	ELEC W 3200	MISS EQ W 6200	TOTAL D W 22500	TO W IN EX 22500	ADAPTER W 0	LAUNCH W 22500
TYPE ST EXO	TYPE PROP ...NONE...	TYPE PROPE ...NONE...	TYPE A C ...NONE...	TYPE EP FUEL CELL	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

PALLET TYPE - EARTH OBS. NSO-5A 06/11/71

MISS. OBJ. PROVIDE A TEST BED TO CONDUCT SCIENTIST-ASTRONAUT TRAINING AND AUTOMATED EXPERIMENTS.

PAYLOAD CUPR.EXP.	PROGRAM N SORTIE	AGENCY NASA	NO SATS 1	CHAR VELOC 2.5800E+04	CIRC ALTIT 125.0	NOM INCLIN 90.00	NOM APOG 125.0	NOM PERIG 125.0
NOM ECCENT 0.	MAX APOG 125.0	MIN APOG 125.0	MAX PERIG 125.0	MIN PERIG 125.0	MAX INCLIN 90.00	MIN INCLIN 90.00	LCH WINDOW *NO ENTRY*	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1980	FLTS 1979 0	FLTS 1980 1	FLTS 1981 1	FLTS 1982 2	FLTS 1983 0	FLTS 1984 0	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 4	SYS LF 2	MEAN MISS 4.0000E-02	TYPE MNT R EVA
EXP MNT PH EVA	MAX PLD VS *NO ENTRY*	MIN PLD VS *NO ENTRY*	LCH VOLUME 5696	LCH LENGTH 37.00	LCH DIAM 14.00	SENSOR 1 EARTH OBS.	SENSOR 2 MAN	SENSOR 3 ...NONE...
SENSOR 4 ...NONE...	SENSOR 5 MAN	POINT ACC 0.5 DEG	AV PWR 100.0	ST M V A W 2300	ENV CONT W 930	GD NA ST W 0	PROPULS W 0	P PROPEL W 0
ATT CONT W 0	A.C.PROP. 0	TTC W 100	ELEC W 170	MISS EQ W 2500	TOTAL D W 6000	TO W IN EX 6000	ADAPTER W 0	LAUNCH W 6000
TYPE ST EXO	TYPE PROP ...NONE...	TYPE PROPE ...NONE...	TYPE A C ...NONE...	TYPE EP FUEL CELL	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

PALLET TYPE - BIO RESEARCH NSO-5B 06/11/71

MISS. OBJ. PROVIDE A TEST BED TO CONDUCT SCIENTIFIC-ASTRONAUT TRAINING AND AUTOMATED EXPERIMENTS.

PAYLOAD CURR.EXP.	PROGRAM N SORTIE	AGENCY NASA	NO SATS 1	CHAR VELOC 2.9900E+04	CIRC ALTIT 200.0	NOM INCLIN 28.50	NOM APOG 200.0	NOM PERIG 200.0
NOM ECCENT 0.	MAX APOG 200.0	MIN APOG 200.0	MAX PERIG 200.0	MIN PERIG 200.0	MAX INCLIN 28.50	MIN INCLIN 28.50	LCH WINDOW *NO ENTRY*	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1979	FLTS 1979 1	FLTS 1980 0	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 1	SYS LF 5	MEAN MISS 4.0000E-02	TYPE MNT R EVA
EXP MNT PH EVA	MAX PLD VS *NO ENTRY*	MIN PLD VS *NO ENTRY*	LCH VOLUME 5696	LCH LENGTH 37.00	LCH DIAM 14.00	SENSOR 1 BIO.RES.	SENSOR 2 MAN	SENSOR 3 ...NONE...
SENSOR 4 ...NONE...	SENSOR 5 ...NONE...	POINT ACC 0.5 DEG	AV PWR 100.0	ST M V A W 2300	ENV CONT W 930	GD NA ST W 0	PROPULS W 0	P PROPEL W 0
ATT CONT W 0	A.C.PROP. 0	TTC W 100	ELEC W 170	MISS EQ W 800	TOTAL D W 4300	TO W IN EX 4300	ADAPTER W 0	LAUNCH W 4300
TYPE ST EXO	TYPE PROP ...NONE...	TYPE PROPE ...NONE...	TYPE A C SHUTTLE	TYPE EP FUEL CELL	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. PROVIDE A TEST BED TO CONDUCT SCIENTIFIC-ASTRONAUT TRAINING AND AUTOMATED EXPERIMENTS.

PAYLOAD CURR.EXP.	PROGRAM N SORTIE	AGENCY NASA	NO SATS 1	CHAR VELOC 2.9900E+04	CIRC ALTIT 200.0	NOM INCLIN 28.50	NOM APOG 200.0	NOM PERIG 200.0
NOM ECCENT 0.	MAX APOG 200.0	MIN APOG 200.0	MAX PERIG 200.0	MIN PERIG 200.0	MAX INCLIN 28.50	MIN INCLIN 28.50	LCH WINDOW *NO ENTRY*	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1980	FLTS 1979 0	FLTS 1980 2	FLTS 1981 2	FLTS 1982 2	FLTS 1983 1	FLTS 1984 0	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 7	SYS LF 5	MEAN MISS 4.0000E-02	TYPE MNT R EVA
EXP MNT PH EVA	MAX PLD VS *NO ENTRY*	MIN PLD VS *NO ENTRY*	LCH VOLUME 5696	LCH LENGTH 37.00	LCH DIAM 14.00	SENSOR 1 ASTRONOMY	SENSOR 2 MAN	SENSOR 3 ...NONE...
SENSOR 4 ...NONE...	SENSOR 5 ...NONE...	POINT ACC 0.5 DEG	AV PWR 100.0	ST M V A W 2300	ENV CONT W 930	GD NA ST W 0	PROPULS W 0	P PROPEL W 0
ATT CONT W 0	A.C.PROP. 0	TTC W 100	ELEC W 170	MISS EQ W 2200	TOTAL D W 5700	TO W IN EX 5700	ADAPTER W 0	LAUNCH W 5700
TYPE ST EXO	TYPE PROP ...NONE...	TYPE PROPE ...NONE...	TYPE A C SHUTTLE	TYPE EP FUEL CELL	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

PALLET TYPE - FLUID MGT NSO-5D 06/11/71

MISS. OBJ. PROVIDE A TEST BED TO CONDUCT SCIENTIST-ASTRONAUT TRAINING AND AUTOMATED EXPERIMENTS.

PAYLOAD CURR.EXP.	PROGRAM N SORTIE	AGENCY NASA	NO SATS 1	CHAR VELOC 2.9900E+04	CIRC ALTIT 200.0	NOM INCLIN 28.50	NOM APOG 200.0	NOM PERIG 200.0
NOM ECCENT 0.	MAX APOG 200.0	MIN APOG 200.0	MAX PERIG 200.0	MIN PERIG 200.0	MAX INCLIN 28.50	MIN INCLIN 28.50	LCH WINDOW *NO ENTRY*	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1980	FLTS 1979 0	FLTS 1980 1	FLTS 1981 0	FLTS 1982 0	FLTS 1983 1	FLTS 1984 0	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 2	SYS LF 5	MEAN MISS 4.0000E-02	TYPE MNT R EVA
EXP MNT PH EVA	MAX PLD VS *NO ENTRY*	MIN PLD VS *NO ENTRY*	LCH VOLUME 5696	LCH LENGTH 37.00	LCH DIAM 14.00	SENSOR 1 FLUID MGT	SENSOR 2 MAN	SENSOR 3 ...NONE...
SENSOR 4 ...NONE...	SENSOR 5 ...NONE...	POINT ACC 0.5 DEG	AV PWR 100.0	ST M V A W 2300	ENV CONT W 930	GD NA ST W 0	PROPULS W 0	P PROPEL W 0
ATT CONT W 0	A.C.PROP. 0	TTC W 100	ELEC W 170	MISS EQ W 3600	TOTAL D W 7100	TO W IN EX 7100	ADAPTER W 0	LAUNCH W 7100
TYPE ST EXO	TYPE PROP ...NONE...	TYPE PROPE ...NONE...	TYPE A C SHUTTLE	TYPE EP FUEL CELL	TYPE KICK *NO ENTRY*	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

PALLET TYPE - TELEOPERATOR NSO-5E 06/11/71

MISS. OBJ. PROVIDE A TEST BED TO CONDUCT SCIENTIFIC-ASTRONAUT TRAINING AND AUTOMATED EXPERIMENTS.

PAYLOAD CURR.EXP.	PROGRAM N SORTIE	AGENCY NASA	NO SATS 1	CHAR VELOC 2.9900E+04	CIRC ALTIT 200.0	NOM INCLIN 28.50	NOM APOG 200.0	NOM PERIG 200.0
NOM ECCENT 0.	MAX APOG 200.0	MIN APOG 200.0	MAX PERIG 200.0	MIN PERIG 200.0	MAX INCLIN 28.50	MIN INCLIN 28.57	LCH WINDOW *NO ENTRY*	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1979	FLTS 1979 0	FLTS 1980 1	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 1	SYS LF 5	MEAN MISS 4.0000E-02	TYPE MNT R EVA
EXP MNT PH EVA	MAX PLD VS *NO ENTRY*	MIN PLD VS *NO ENTRY*	LCH VOLUME 5696	LCH LENGTH 37.00	LCH DIAM 14.00	SENSOR 1 TELEOP.	SENSOR 2 MAN	SENSOR 3 ...NONE...
SENSOR 4 ...NONE...	SENSOR 5 ...NONE...	POINT ACC 0.5 DEG	AV PWR 100.0	ST M V A W 2300	ENV CONT W 930	GD NA ST W 0	PROPULS W 0	P PROPEL W 0
ATT CONT W 0	A.C.PROP. 0	TTC W 100	ELEC W 170	MISS EQ W 1500	TOTAL D W 5000	TO W IN EX 5000	ADAPTER W 0	LAUNCH W 5000
TYPE ST EXO	TYPE PROP ...NONE...	TYPE PROPE ...NONE...	TYPE A C SHUTTLE	TYPE EP FUEL CELL	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

PALLET TYPE - MAN WORK PLTF. NSO-5F

06/11/71

MISS. OBJ. PROVIDE A TEST BED TO CONDUCT SCIENTIFIC-ASTRONAUT TRAINING AND AUTOMATED EXPERIMENTS.

PAYLOAD CURR.EXP.	PROGRAM N SORTIE	AGENCY NASA	NO SATS 1	CHAR VELOC 2.9900E+04	CIRC ALTIT 200.0	NOM INCLIN 28.50	NOM APOG 200.0	NOM PERIG 200.0
NOM ECCENT 0.	MAX APOG 200.0	MIN APOG 200.0	MAX PERIG 200.0	MIN PERIG 200.0	MAX INCLIN 28.50	MIN INCLIN 28.50	LCH WINDOW *NO ENTRY*	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1981	FLTS 1979 0	FLTS 1980 0	FLTS 1981 1	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 1	SYS LF 5	MEAN MISS 4.0000E-02	TYPE MNT R EVA
EXP MNT PH EVA	MAX PLD VS *NO ENTRY*	MIN PLD VS *NO ENTRY*	LCH VOLUME 5696	LCH LENGTH 37.00	LCH DIAM 14.00	SENSOR 1 MAN WORK	SENSOR 2 MAN	SENSOR 3 ...NONE...
SENSOR 4 ...NONE...	SENSOR 5 ...NONE...	POINT ACC 0.5 DEG	AV PWR 100.0	ST M V A W 2300	ENV CONT W 930	GD NA ST W 0	PROPULS W 0	P PROPEL W 0
ATT CONT W 0	A.C.PROP. 0	TTC W 100	ELEC W 170	MISS EQ W 3200	TOTAL D W 6700	TO W IN EX 6700	ADAPTER W 0	LAUNCH W 6700
TYPE ST EXO	TYPE PROP ...NONE...	TYPE PROPE ...NONE...	TYPE A C SHUTTLE	TYPE EP FUEL CELL	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

PALLET TYPE - LG. TEL. TEST　　　　NSO-5G　　　　06/11/71

MISS. OBJ.　PROVIDE A TEST BED TO CONDUCT SCIENTIFIC-ASTRONAUT TRAINING AND AUTOMATED EXPERIMENTS.

PAYLOAD CURR.EXP.	PROGRAM N SORTIE	AGENCY NASA	NO SATS 1	CHAR VELOC 2.9900E+04	CIRC ALTIT 200.0	NOM INCLIN 28.50	NOM APOG 200.0	NOM PERIG 200.0
NOM ECCENT 0.	MAX APOG 200.0	MIN APOG 200.0	MAX PERIG 200.0	MIN PERIG 200.0	MAX INCLIN 28.50	MIN INCLIN 28.50	LCH WINDOW *NO ENTRY*	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1979	FLTS 1979 1	FLTS 1980 0	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 1	SYS LF 5	MEAN MISS 4.0000E-02	TYPE MNT R EVA
EXP MNT PH EVA	MAX PLD VS *NO ENTRY*	MIN PLD VS *NO ENTRY*	LCH VOLUME 7851	LCH LENGTH 51.00	LCH DIAM 14.00	SENSOR 1 LG.TEL.	SENSOR 2 MAN	SENSOR 3 ...NONE...
SENSOR 4 ...NONE...	SENSOR 5 ...NONE...	POINT ACC 0.5 DEG	AV PWR 100.0	ST M V A W 2300	ENV CONT W 930	GD NA ST W 0	PROPULS W 0	P PROPEL W 0
ATT CONT W 0	A.C.PROP. 0	TTC W 100	ELEC W 170	MISS EQ W 9500	TOTAL D W 13000	TO W IN EX 13000	ADAPTER W 0	LAUNCH W 13000
TYPE ST EXO	TYPE PROP ...NONE...	TYPE PROPE ...NONE...	TYPE A C SHUTTLE	TYPE EP FUEL CELL	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

PALLET TYPE - ASTRO. MANV. UNI　　　NSO-5H　　　06/11/71

MISS. OBJ.　PROVIDE A TEST BED TO CONDUCT SCIENTIFIC-ASTRONAUT TRAINING AND AUMATED EXPERIMENTS.

PAYLOAD CURR.EXP.	PROGRAM N SORTIE	AGENCY NASA	NO SATS 1	CHAR VELOC 2.9900E+04	CIRC ALTIT 200.0	NOM INCLIN 28.50	NOM APOG 200.0	NOM PERIG 200.0
NOM ECCENT 0.	MAX APOG 200.0	MIN APOG 200.0	MAX PERIG 200.0	MIN PERIG 200.0	MAX INCLIN 28.50	MIN INCLIN 28.50	LCH WINDOW *NO ENTRY*	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1980	FLTS 1979 0	FLTS 1980 1	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 1	SYS LF 5	MEAN MISS 4.0000E-02	TYPE MNT R EVA
EXP MNT PH EVA	MAX PLD VS *NO ENTRY*	MIN PLD VS *NO ENTRY*	LCH VOLUME 5696	LCH LENGTH 37.00	LCH DIAM 14.00	SENSOR 1 AMU	SENSOR 2 MAN	SENSOR 3 ...NONE...
SENSOR 4 ...NONE...	SENSOR 5 ...NONE...	POINT ACC 0.5 DEG	AV PWR 100.0	ST M V A W 2300	ENV CONT W 930	GD NA ST W 0	PROPULS W 0	P PROPEL W 0
ATT CONT W 0	A.C.PROP. 0	TTC W 100	ELEC W 170	MISS EQ W 300	TOTAL D W 3800	TO W IN EX 3800	ADAPTER W 0	LAUNCH W 3800
TYPE ST EXO	TYPE PROP ...NONE...	TYPE PROPE ...NONE...	TYPE A C SHUTTLE	TYPE EP FUEL CELL	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

INTEGRAL SPACE STATION NSS-1

MISS. OBJ. LONG TERM MANNED SPACE OPERATIONS 06/11/71

PAYLOAD CURR.EXP.	PROGRAM N SPA STAT	AGENCY NASA	NO SATS 1	CHAR VELOC 2.6200E+04	CIRC ALTIT 270.0	NOM INCLIN 55.00	NOM APOG 270.0	NOM PERIG 270.0
NOM ECCENT 0.	MAX APOG 270.0	MIN APOG 270.0	MAX PERIG 270.0	MIN PERIG 270.0	MAX INCLIN 55.00	MIN INCLIN 55.00	LCH WINDOW *NO ENTRY*	LCH VEH 1 INT-21
LCH SITE 1 ETR	IN LCH DAT 1981	FLTS 1979 0	FLTS 1980 0	FLTS 1981 1	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 1	SYS LF 10	MEAN MISS .3300	TYPE MNT R MNT/R
EXP MNT PH IN-SPACE	MAX PLD VS *NO ENTRY*	MIN PLD VS *NO ENTRY*	LCH VOLUME 53884	LCH LENGTH 63.00	LCH DIAM 33.00	SENSOR 1 EARTH RES.	SENSOR 2 ASTRONOMY	SENSOR 3 LIFE SCI
SENSOR 4 MATL SCI	SENSOR 5 MAN	POINT ACC .25 DEG	AV PWR 2.9000E+04	ST M V A W 55297	ENV CONT W 11818	GD NA ST W 964	PROPULS W 0	P PROPEL W 0
ATT CONT W 1010	A.C.PROF. 516	TTC W 5214	ELEC W 19193	MISS EQ W 17799	TOTAL D W 110779	TO W IN EX 111295	ADAPTER W 4000	LAUNCH W 115295
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP RIB	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MODULAR SPACE STATION - CORE NSS-2A 06/11/71

MISS. OBJ. LONG-TERM MANNED SPACE OPERATIONS, CORE MODULE

PAYLOAD CURR.EXP.	PROGRAM N SPA STA	AGENCY NASA	NO SATS 1	CHAR VELOC 2.6200E+04	CIRC ALTIT 270.0	NOM INCLIN 55.00	NOM APOG 270.0	NOM PERIG 270.0
NOM ECCENT 0.	MAX APOG 270.0	MIN APOG 270.0	MAX PERIG 270.0	MIN PERIG 55.00	MAX INCLIN 55.00	MIN INCLIN *NO ENTRY*	LCH WINDOW ...NONE...	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1981	FLTS 1979 0	FLTS 1980 0	FLTS 1981 1	FLTS 1982 0	FLTS 1983 0	FLTS 1984 1	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 2	SYS LF 10	MEAN MISS .3300	TYPE MNT R MAINT/R
EXP MNT PH RPL.EXP.	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 6158	LCH LENGTH 40.00	LCH DIAM 14.00	SENSOR 1 MAN	SENSOR 2 CORE	SENSOR 3 *NO ENTRY*
SENSOR 4 *NO ENTRY*	SENSOR 5 *NO ENTRY*	POINT ACC 0.25 DEG	AV PWR 500.0	ST M V A W 5393	ENV CONT W 7133	GD NA ST W 0	PROPULS W 0	P PROPEL W 0
ATT CONT W 30	A.C.PROP. 20	TTC W 0	ELEC W 3800	MISS EQ W 3644	TOTAL D W 19980	TO W IN EX 20000	ADAPTER W 0	LAUNCH W 20000
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP BATTERIES	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. LONG-TERM MANNED SPACE OPERATIONS, POWER MODULE.

PAYLOAD CURR.EXP.	PROGRAM N SPA STA	AGENCY NASA	NO SATS 1	CHAR VELOC 2.6200E+04	CIRC ALTIT 270.0	NOM INCLIN 55.00	NOM APOG 270.0	NOM PERIG 270.0
NOM ECCENT 0.	MAX APOG 270.0	MIN APOG 270.0	MAX PERIG 270.0	MIN PERIG 55.00	MAX INCLIN 55.00	MIN INCLIN *NO ENTRY*	LCH WINDOW ...NONE...	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1981	FLTS 1979 0	FLTS 1980 0	FLTS 1981 1	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 0
FLTS 1986 *NO ENTRY*	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 1	SYS LF 10	MEAN MISS .3300	TYPE MNT R MAINT/R
EXP MNT PH RPL.EXP.	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 4618	LCH LENGTH 30.00	LCH DIAM 14.00	SENSOR 1 MAN	SENSOR 2 POWER	SENSOR 3 *NO ENTRY*
SENSOR 4 *NO ENTRY*	SENSOR 5 *NO ENTRY*	POINT ACC 0.25	AV PWR 1.5000E+04	ST M V A W 6724	ENV CONT W 1102	GD NA ST W 0	PROPULS W 0	P PROPEL W 0
ATT CONT W 848	A.C.PROP. 648	TTC W 0	ELEC W 9959	MISS EQ W 1367	TOTAL D W 19352	TO W IN EX 20000	ADAPTER W 0	LAUNCH W 20000
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MODULAR SPACE STATION - CREW NSS-2C 06/11/71

MISS. OBJ. LONG-TERM MANNED SPACE OPERATIONS, CREW MODULE.

PAYLOAD CURR.EXP.	PROGRAM N SPA STA	AGENCY NASA	NO SATS 2	CHAR VELOC 2.6200E+04	CIRC ALTIT 270.0	NOM INCLIN 55.00	NOM APOG 270.0	NOM PERIG 270.0
NOM ECCENT 0.	MAX APOG 270.0	MIN APOG 270.0	MAX PERIG 270.0	MIN PERIG 55.00	MAX INCLIN 55.00	MIN INCLIN *NO ENTRY*	LCH WINDOW ...NONE...	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1981	FLTS 1979 0	FLTS 1980 0	FLTS 1981 2	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 2
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 4	SYS LF 10	MEAN MISS .3300	TYPE MNT R MAINT/R
EXP MNT PH RPL.EXP.	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 4618	LCH LENGTH 30.00	LCH DIAM 14.00	SENSOR 1 MAN	SENSOR 2 CREW	SENSOR 3 *NO ENTRY*
SENSOR 4 *NO ENTRY*	SENSOR 5 *NO ENTRY*	POINT ACC .25	AV PWR 1.5000E+04	ST M V A W 5393	ENV CONT W 7133	GD NA ST W 0	PROPULS W 0	P PROPEL W 0
ATT CONT W 30	A.C.PROP. 20	TTC W 0	ELEC W 3800	MISS EQ W 3644	TOTAL D W 19980	TO W IN EX 20000	ADAPTER W 0	LAUNCH W 20000
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP FUEL CELL	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MODULAR SPACE STATION - CONTRO NSS-2D 06/11/71

MISS. OBJ. LONG-TERM MANNED SPACE OPERATIONS, CONTROL MODULE.

PAYLOAD CURR.EXP.	PROGRAM N SPA STA	AGENCY NASA	NO SATS 2	CHAR VELOC 2.6200E+04	CIRC ALTIT 270.0	NOM INCLIN 55.00	NOM APOG 270.0	NOM PERIG 270.0
NOM ECCENT 0.	MAX APOG 270.0	MIN APOG 270.0	MAX PERIG 270.0	MIN PERIG 55.00	MAX INCLIN 55.00	MIN INCLIN *NO ENTRY*	LCH WINDOW ...NONE...	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1981	FLTS 1979 0	FLTS 1980 0	FLTS 1981 2	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 2	SYS LF 10	MEAN MISS .3300	TYPE MNT R MAINT/R
EXP MNT PH RPL.EXP.	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 4618	LCH LENGTH 30.00	LCH DIAM 14.00	SENSOR 1 MAN	SENSOR 2 CONTROLS	SENSOR 3 *NO ENTRY*
SENSOR 4 *NO ENTRY*	SENSOR 5 *NO ENTRY*	POINT ACC .25	AV PWR 1000	ST M V A W 5393	ENV CONT W 7133	GD NA ST W 0	PROPULS W 0	P PROPEL W 0
ATT CONT W 30	A.C.PROP. 20	TTC W 0	ELEC W 3800	MISS EQ W 4344	TOTAL D W 20680	TO W IN EX 20700	ADAPTER W 0	LAUNCH W 20700
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP BATTERIES	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MODULAR SPACE STATION - LAB.   NSS-2E   06/11/71

MISS. OBJ.   LONG-TERM MANNED SPACE OPERATIONS, GENERAL PURPOSE LAB.

PAYLOAD CURR.EXP.	PROGRAM N SPA STA	AGENCY NASA	NO SATS 1	CHAR VELOC 2.6200E+04	CIRC ALTIT 270.0	NOM INCLIN 55.00	NOM APOG 270.0	NOM PERIG 270.0
NOM ECCENT 0.	MAX APOG 270.0	MIN APOG 270.0	MAX PERIG 270.0	MIN PERIG 55.00	MAX INCLIN 55.00	MIN INCLIN *NO ENTRY*	LCH WINDOW ...NONE...	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1985	FLTS 1979 0	FLTS 1980 0	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 1
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 1	SYS LF 10	MEAN MISS .3300	TYPE MNT R MAINT/R
EXP MNT PH RPL.EXP.	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 4618	LCH LENGTH 30.00	LCH DIAM 14.00	SENSOR 1 MAN	SENSOR 2 LABORATORY	SENSOR 3 *NO ENTRY*
SENSOR 4 *NO ENTRY*	SENSOR 5 *NO ENTRY*	POINT ACC ...NONE...	AV PWR 1.5000E+04	ST M V A W 7179	ENV CONT W 1170	GD NA ST W 0	PROPULS W 0	P PROPEL W 0
ATT CONT W 30	A.C.PROP. 20	TTC W 0	ELEC W 4186	MISS EQ W 8135	TOTAL D W 20680	TO W IN EX 20700	ADAPTER W 0	LAUNCH W 20700
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. RESUPPLY OF ORBITING SPACE STATION AND TRANSPORTATION OF 9 MEN, CREW MODULE.

PAYLOAD CURR.EXP.	PROGRAM N SP STA	AGENCY NASA	NO SATS 1	CHAR VELOC 2.6200E+04	CIRC ALTIT 270.0	NOM INCLIN *NO ENTRY*	NOM APOG 270.0	NOM PERIG 270.0
NOM ECCENT 0.	MAX APOG 270.0	MIN APOG 270.0	MAX PERIG 270.0	MIN PERIG 90.00	MAX INCLIN 28.00	MIN INCLIN *NO ENTRY*	LCH WINDOW ...NONE...	LCH VEH 1 *NO ENTRY*
LCH SITE 1 ETR	IN LCH DAT 1981	FLTS 1979 0	FLTS 1980 0	FLTS 1981 1	FLTS 1982 6	FLTS 1983 6	FLTS 1984 6	FLTS 1985 6
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 25	SYS LF 10	MEAN MISS 4.0000E-02	TYPE MNT R MAINT/R
EXP MNT PH REFURB .	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 8659	LCH LENGTH 49.00	LCH DIAM 15.00	SENSOR 1 DOCKING	SENSOR 2 MAN	SENSOR 3 CARGO
SENSOR 4 *NO ENTRY*	SENSOR 5 *NO ENTRY*	POINT ACC 0.25	AV PWR 964.0	ST M V A W 7928	ENV CONT W 998	GD NA ST W 478	PROPULS W 0	P PROPEL W 0
ATT CONT W 720	A.C.PROP. 316	TTC W 297	ELEC W 437	MISS EQ W 13096	TOTAL D W 23638	TO W IN EX 23954	ADAPTER W 0	LAUNCH W 23954
TYPE ST EXO	TYPE PROP SOLID	TYPE PROPE SOLID	TYPE A C ENTRY	TYPE EP FUEL CELL	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. RESUPPLY OF ORBITING SPACE STATION AND TRANSPORTATION OF 9 MEN, CARGO PROPULSION MODULE.

PAYLOAD CURR.EXP.	PROGRAM N SP STA	AGENCY NASA	NO SATS 1	CHAR VELOC 2.6200E+04	CIRC ALTIT 270.0	NOM INCLIN *NO ENTRY*	NOM APOG 270.0	NOM PERIG 270.0
NOM ECCENT 0.	MAX APOG 270.0	MIN APOG 270.0	MAX PERIG 270.0	MIN PERIG 90.00	MAX INCLIN 28.00	MIN INCLIN *NO ENTRY*	LCH WINDOW ...NONE...	LCH VEH 1 *NO ENTRY*
LCH SITE 1 ETR	IN LCH DAT 1981	FLTS 1979 0	FLTS 1980 0	FLTS 1981 1	FLTS 1982 6	FLTS 1983 6	FLTS 1984 6	FLTS 1985 6
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 25	SYS LF 10	MEAN MISS 4.0000E-02	TYPE MNT R MAINT/R
EXP MNT PH REFURB .	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 4418	LCH LENGTH 25.00	LCH DIAM 15.00	SENSOR 1 DOCKING	SENSOR 2 MAN	SENSOR 3 CARGO
SENSOR 4 *NO ENTRY*	SENSOR 5 *NO ENTRY*	POINT ACC 0.25	AV PWR 0.	ST M V A W 4256	ENV CONT W 1090	GD NA ST W 25	PROPULS W 8452	P PROPEL W 6963
ATT CONT W 0	A.C.PROP. 0	TTC W 135	ELEC W 1112	MISS EQ W 6680	TOTAL D W 14797	TO W IN EX 21760	ADAPTER W 0	LAUNCH W 21760
TYPE ST EXO	TYPE PROP SOLID	TYPE PROPE SOLID	TYPE A C ENTRY	TYPE EP FUEL CELL	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. RESUPPLY OF ORBITING SPACE STATION AND TRANSPORTATIONS OF 12 MEN, CREW MODULE.

PAYLOAD CURR.EXP.	PROGRAM N SPA STA	AGENCY NASA	NO SATS 1	CHAR VELOC 2.6200E+04	CIRC ALTIT 270.0	NOM INCLIN 55.00	NOM APOG 270.0	NOM PERIG 270.0
NOM ECCENT 0.	MAX APOG 270.0	MIN APOG 270.0	MAX PERIG 270.0	MIN PERIG 270.0	MAX INCLIN 90.00	MIN INCLIN 28.00	LCH WINDOW ...NONE...	LCH VEH 1 INT-20
LCH SITE 1 ETR	IN LCH DAT 1986	FLTS 1979 0	FLTS 1980 0	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 0
FLTS 1986 6	FLTS 1987 6	FLTS 1988 6	FLTS 1989 6	FLTS 1990 6	TOTAL FLTS 30	SYS LF 10	MEAN MISS 4.0000E-02	TYPE MNT R MAINT/R
EXP MNT PH REFURB	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 19601	LCH LENGTH 53.00	LCH DIAM 21.70	SENSOR 1 0.25	SENSOR 2 MAN	SENSOR 3 CARGO
SENSOR 4 *NO ENTRY*	SENSOR 5 *NO ENTRY*	POINT ACC *NO ENTRY*	AV PWR 1068	ST M V A W 7509	ENV CONT W 1055	GD NA ST W 503	PROPULS W 0	P PROPEL W 0
ATT CONT W 673	A.C.PROP. 247	TTC W 393	ELEC W 805	MISS EQ W 13478	TOTAL D W 24169	TO W IN EX 24416	ADAPTER W 0	LAUNCH W 24416
TYPE ST EXO	TYPE PROP SOLID	TYPE PROPE SOLID	TYPE A C ENTRY	TYPE EP FUEL CELL	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

ADVANCED RIG G NSS-4B 06/11/71

MISS. OBJ. RESUPPLY OF ORBITING SPACE STATION AND TRANSPORTATION OF 12 MEN, CARGO/PROPULSION MODULE.

PAYLOAD CURR.EXP.	PROGRAM N SPA STA	AGENCY NASA	NO SATS 1	CHAR VELOC 2.6200E+04	CIRC ALTIT 270.0	NOM INCLIN 55.00	NOM APOG 270.0	NOM PERIG 270.0
NOM ECCENT 0.	MAX APOG 270.0	MIN APOG 270.0	MAX PERIG 270.0	MIN PERIG 270.0	MAX INCLIN 90.00	MIN INCLIN 28.00	LCH WINDOW ...NONE...	LCH VEH 1 INT-20
LCH SITE 1 ETR	IN LCH DAT 1986	FLTS 1979 0	FLTS 1980 0	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 0
FLTS 1986 5	FLTS 1987 6	FLTS 1988 6	FLTS 1989 6	FLTS 1990 6	TOTAL FLTS 30	SYS LF 10	MEAN MISS 4.0000E-02	TYPE MNT R MAINT/R
EXP MNT PH REFURB	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 15903	LCH LENGTH 43.00	LCH DIAM 21.70	SENSOR 1 DOCKING	SENSOR 2 MAN	SENSOR 3 CARGO
SENSOR 4 *NO ENTRY*	SENSOR 5 *NO ENTRY*	POINT ACC *NO ENTRY*	AV PWR 0.	ST M V A W 12564	ENV CONT W 1674	GD NA ST W 12	PROPULS W 20949	P PROPEL W 17459
ATT CONT W 0	A.C.PROP. 0	TTC W 166	ELEC W 312	MISS EQ W 69014	TOTAL D W 87232	TO W IN EX 104691	ADAPTER W 0	LAUNCH W 104691
TYPE ST EXO	TYPE PROP SOLID	TYPE PROPE SOLID	TYPE A C ENTRY	TYPE EP FUEL CELL	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

EXPERIMENT MOD.-1 - LIFE SCIEN NSS-5A 06/11/71

MISS. OBJ. SUPPORT OF X-RAY,STELLAR,SOLAR,HIGH-ENERGY STELLAR,MATERIAL SCIENCE AND PROCESSING,AND SPACE BIOLOGY EXPERIMENTS.

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
CURR.EXP.	N SPA STAT	NASA	1	2.6800E+04	270.0	55.00	270.0	270.0
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
0.	270.0	270.0	270.0	270.0	55.00	55.00	*NO ENTRY*	SHUTTLE
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
ETR	1981	0	0	1	0	0	0	1
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
0	0	0	0	0	2	3	.3300	MNT/R
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
RTRN EARTH	*NO ENTRY*	*NO ENTRY*	10249	58.00	15.00	TELESCOPE	LIFE SCI.	MATERIAL
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
MAN	*NO ENTRY*	2 SEC	1800	9681	2262	1953	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
3721	2560	381	1934	6875	24247	26807	900	27707
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
EXO	LIQUID	HYDRAZINE	3-AXIS	SOLAR	...NONE...	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

MISS. OBJ. SUPPORT OF X-RAY,STELLAR,SOLAR,HIGH-ENERGY STELLAR,MATERIAL SCIENCE AND PROCESSING,AND SPACE BIOLOGY EXPERIMENTS.

PAYLOAD CURR.EXP.	PROGRAM N SPA STAT	AGENCY NASA	NO SATS 1	CHAR VELOC 2.6800E+04	CIRC ALTIT 270.0	NOM INCLIN 55.00	NOM APOG 270.0	NOM PERIG 270.0
NOM ECCENT 0.	MAX APOG 270.0	MIN APOG 270.0	MAX PERIG 270.0	MIN PERIG 270.0	MAX INCLIN 55.00	MIN INCLIN 55.00	LCH WINDOW *NO ENTRY*	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1981	FLTS 1979 0	FLTS 1980 0	FLTS 1981 1	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 1
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 2	SYS LF 3	MEAN MISS .3300	TYPE MNT R MNT/R
EXP MNT PH RTRN EARTH	MAX PLD VS *NO ENTRY*	MIN PLD VS *NO ENTRY*	LCH VOLUME 10249	LCH LENGTH 58.00	LCH DIAM 15.00	SENSOR 1 TELESCOPE	SENSOR 2 LIFE SCI.	SENSOR 3 MATERIAL
SENSOR 4 MAN	SENSOR 5 *NO ENTRY*	POINT ACC 2 SEC	AV PWR 1800	ST M V A W 9681	ENV CONT W 2262	GD NA ST W 1953	PROPULS W 0	P PROPEL W 0
ATT CONT W 3721	A.C.PROP. 2560	TTC W 381	ELEC W 1934	MISS EQ W 6875	TOTAL D W 24247	TO W IN EX 26807	ADAPTER W 900	LAUNCH W 27707
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

EXPERIMENT MOD.-1 - SPACE MFD NSS-5C

06/11/71

MISS. OBJ. SUPPORT OF X-RAY,STELLAR,SOLAR,HIGH-ENERGY STELLAR,MATERIAL SCIENCE AND PROCESSING,AND SPACE BIOLOGY EXPERIMENTS.

PAYLOAD CURR.EXP.	PROGRAM N SPA STAT	AGENCY NASA	NO SATS 1	CHAR VELOC 2.6800E+04	CIRC ALTIT 270.0	NOM INCLIN 55.00	NOM APOG 270.0	NOM PERIG 270.0
NOM ECCENT 0.	MAX APOG 270.0	MIN APOG 270.0	MAX PERIG 270.0	MIN PERIG 270.0	MAX INCLIN 55.00	MIN INCLIN 55.00	LCH WINDOW *NO ENTRY*	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1990	FLTS 1979 0	FLTS 1980 0	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 1	TOTAL FLTS 1	SYS LF 3	MEAN MISS .3300	TYPE MNT R MNT/R
EXP MNT PH RTRN EARTH	MAX PLD VS *NO ENTRY*	MIN PLD VS *NO ENTRY*	LCH VOLUME 10249	LCH LENGTH 58.00	LCH DIAM 15.00	SENSOR 1 TELESCOPE	SENSOR 2 LIFE SCI.	SENSOR 3 MATERIAL
SENSOR 4 MAN	SENSOR 5 *NO ENTRY*	POINT ACC 2 SEC	AV PWR 1800	ST M V A W 9681	ENV CONT W 2262	GD NA ST W 1953	PROPULS W 0	P PROPEL W 0
ATT CONT W 3721	A.C.PROP. 2560	TTC W 381	ELEC W 1934	MISS EQ W 6875	TOTAL D W 24247	TO W IN EX 26807	ADAPTER W 900	LAUNCH W 27707
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTPY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. SUPPORT OF COSMIC RAY, BIOMEDICAL, SPACE BIOLOGY AND CENTRIFUGE EXPERIMENTS.

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
CURR.EXP.	N SPA STAT	NASA	1	2.6200E+04	270.0	55.00	270.0	270.0
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
0.	270.0	270.0	270.0	270.0	55.00	55.00	*NO ENTRY*	*NO ENTRY*
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
ETR	1981	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	2	.3300	MNT/R
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
IN SPACE	*NO ENTRY*	*NO ENTRY*	13685	36.00	22.00	MAN CENTR	COS-RAY	SPACE BIO
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
MAN	*NO ENTRY*	1 DEG	5.0000E+04	8181	1784	307	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
3568	2560	451	697	5580	18008	20568	600	21168
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
EXO	LIQUID	HYDRAZINE	3-AXIS	STA.PWR	...NONE...	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

EXPERIMENT MOD.-3 - PHYS.LAB. NSS-7A

06/11/71

MISS. OBJ. SUPPORT OF EARTH SURVEY, MATERIALS SCIENCES LAB. FLUID PHYS. LAB AND REMOTE MANEUVERING UNIT EXPERIMENTS.

PAYLOAD CURR.EXP.	PROGRAM N SPA STAT	AGENCY NASA	NO SATS 1	CHAR VELOC 2.6200E+04	CIRC ALTIT 270.0	NOM INCLIN 55.00	NOM APOG 270.0	NOM PERIG 270.0
NOM ECCENT 0.	MAX APOG 270.0	MIN APOG 270.0	MAX PERIG 270.0	MIN PERIG 270.0	MAX INCLIN 55.00	MIN INCLIN 55.00	LCH WINDOW *NO ENTRY*	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1983	FLTS 1979 0	FLTS 1980 0	FLTS 1981 0	FLTS 1982 0	FLTS 1983 1	FLTS 1984 0	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 1	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 2	SYS LF 4	MEAN MISS .3300	TYPE MNT R *NO ENTRY*
EXP MNT PH RTRN EARTH	MAX PLD VS *NO ENTRY*	MIN PLD VS *NO ENTRY*	LCH VOLUME 7245	LCH LENGTH 41.00	LCH DIAM 15.00	SENSOR 1 PASS REF	SENSOR 2 TRNSPONDER	SENSOR 3 LASER RADR
SENSOR 4 MAN	SENSOR 5 *NO ENTRY*	POINT ACC 20 SEC	AV PWR 5000	ST M V A W 12048	ENV CONT W 2356	GD NA ST W 359	PROPULS W *NO ENTRY*	P PROPEL W *NO ENTRY*
ATT CONT W 3568	A.C.PROP. 2560	TTC W 451	ELEC W 697	MISS EQ W 4602	TOTAL D W 21521	TO W IN EX 24081	ADAPTER W 800	LAUNCH W 24881
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP STA.PWR	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

EXPERIMENT MOD.-3 - COS. LAB. NSS-78 06/11/71

MISS. OBJ. SUPPORT OF EARTH SURVEY, MATERIALS SCIENCES LAB. FLUID PHYS. LAB AND REMOTE MANEUVERING UNIT EXPERIMENTS.

PAYLOAD CUPR.EXP.	PROGRAM N SPA STAT	AGENCY NASA	NO SATS 1	CHAR VELOC 2.6200E+04	CIRC ALTIT 270.0	NOM INCLIN 55.00	NOM APOG 270.0	NOM PERIG 270.0
NOM ECCENT 0.	MAX APOG 270.0	MIN APOG 270.0	MAX PERIG 270.0	MIN PERIG 270.0	MAX INCLIN 55.00	MIN INCLIN 55.00	LCH WINDOW *NO ENTRY*	LCH VEH 1 *NO ENTRY*
LCH SITE 1 ETR	IN LCH DAT 1988	FLTS 1979 0	FLTS 1980 0	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 1	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 1	SYS LF 2	MEAN MISS .3300	TYPE MNT R *NO ENTRY*
EXP MNT PH RTRN EARTH	MAX PLD VS *NO ENTRY*	MIN PLD VS *NO ENTRY*	LCH VOLUME 7245	LCH LENGTH 41.00	LCH DIAM 15.00	SENSOR 1 PASS REF	SENSOR 2 TRNSPONDER	SENSOR 3 LASER RADR
SENSOR 4 MAN	SENSOR 5 *NO ENTRY*	POINT ACC 20 SEC	AV PWR 5000	ST M V A W 12048	ENV CONT W 2356	GD NA ST W 359	PROPULS W 0	P PROPEL W 0
ATT CONT W 3568	A.C.PROP. 2560	TTC W 451	ELEC W 697	MISS EQ W 4602	TOTAL D W 21521	TO W IN EX 24081	ADAPTER W 800	LAUNCH W 24881
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP STA.PWR	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

EXPERIMENT MOD.-3 - COMM/NAV. NSS-7C

06/11/71

MISS. OBJ. SUPPORT OF EARTH SURVEY, MATERIALS SCIENCES LAB. FLUID PHYS. LAB AND REMOTE MANEUVERING UNIT EXPERIMENTS.

PAYLOAD CURR.EXP.	PROGRAM N SPA STAT	AGENCY NASA	NO SATS 1	CHAR VELOC 2.6200E+04	CIRC ALTIT 270.0	NOM INCLIN 55.00	NOM APOG 270.0	NOM PERIG 270.0
NOM ECCENT 0.	MAX APOG 270.0	MIN APOG 270.0	MAX PERIG 270.0	MIN PERIG 270.0	MAX INCLIN 55.00	MIN INCLIN 55.00	LCH WINDOW *NO ENTRY*	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1983	FLTS 1979 0	FLTS 1980 0	FLTS 1981 0	FLTS 1982 0	FLTS 1983 1	FLTS 1984 0	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 1	TOTAL FLTS 2	SYS LF 4	MEAN MISS .3300	TYPE MNT R *NO ENTRY*
EXP MNT PH RTRN EARTH	MAX PLD VS *NO ENTRY*	MIN PLD VS *NO ENTRY*	LCH VOLUME 7245	LCH LENGTH 41.00	LCH DIAM 15.00	SENSOR 1 PASS REF	SENSOR 2 TRNSPONDER	SENSOR 3 LASER RADR
SENSOR 4 MAN	SENSOR 5 *NO ENTRY*	POINT ACC 20 SEC	AV PWR 5000	ST M V A W 12048	ENV CONT W 2356	GD NA ST W 359	PROPULS W 0	P PROPEL W 0
ATT CONT W 3568	A.C.PROP. 2560	TTC W 451	ELEC W 697	MISS EQ W 4602	TOTAL D W 21521	TO W IN EX 24081	ADAPTER W 800	LAUNCH W 24881
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP STA.PWR	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

SPACE STATION - CREW/CARGO NSS-9 06/11/71

MISS. OBJ. SUPPORT THE LOGISTICS REQUIREMENTS OF THE INTEGRAL SPACE STATION AS DOCUMENTED IN NASA DOCUMENT MSFC DRL-160 (CONTRACT NAS8-25140)

PAYLOAD CURR.EXP.	PROGRAM N SPA STAT	AGENCY NASA	NO SATS 2	CHAR VELOC 2.6200E+04	CIRC ALTIT 270.0	NOM INCLIN 55.00	NOM APOG 270.0	NOM PERIG 270.0
NOM ECCENT 0.	MAX APOG 270.0	MIN APOG 270.0	MAX PERIG 270.0	MIN PERIG 270.0	MAX INCLIN 55.00	MIN INCLIN 55.00	LCH WINDOW *NO ENTRY*	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1981	FLTS 1979 0	FLTS 1980 0	FLTS 1981 1	FLTS 1982 6	FLTS 1983 6	FLTS 1984 6	FLTS 1985 6
FLTS 1986 8	FLTS 1987 8	FLTS 1988 8	FLTS 1989 8	FLTS 1990 8	TOTAL FLTS 65	SYS LF ....NA....	MEAN MISS .3300	TYPE MNT R *NO ENTRY*
EXP MNT PH GND.REF	MAX PLD VS *NO ENTRY*	MIN PLD VS *NO ENTRY*	LCH VOLUME 4618	LCH LENGTH 30.00	LCH DIAM 14.00	SENSOR 1 MULT REFL	SENSOR 2 LASER RDR	SENSOR 3 MAN
SENSOR 4 CARGO	SENSOR 5 *NO ENTRY*	POINT ACC 20 SEC	AV PWR 940.0	ST M V A W 5393	ENV CONT W 3653	GD NA ST W 0	PROPULS W 0	P PROPEL W 0
ATT CONT W 243	A.C.PROP. 180	TTC W 0	ELEC W 3647	MISS EQ W 7064	TOTAL D W 19820	TO W IN EX 20000	ADAPTER W 0	LAUNCH W 20000
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP BATTERIES	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

ATTACHED RSRCH AND APPL. NSS-10 06/11/71

MISS. OBJ. EXPERIMENT MODULE ATTACHED TO SPACE STATION

PAYLOAD	PROGRAM	AGENCY	NC SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
CURR.EXP.	N SPA STAT	NASA	1	2.6200E+04	270.0	55.00	270.0	270.0
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
0.	270.0	270.0	270.0	270.0	55.00	55.00	*NO ENTRY*	SHUTTLE
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
ETR	1981	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	2	.3300	MNT/R
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
RTRN EARTH	*NO ENTRY*	*NO ENTRY*	8928	58.00	14.00	LIFE SCI.	EARTH OBS.	PHYSICS
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
MATL SCI	MAN	30 SEC	1.0000E+04	10006	1957	298	0	0
ATT CONT W	A.C.PROF.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
2963	2126	375	580	3821	17874	20000	0	20000
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
EXO	LIQUID	HYDRAZINE	3-AXIS	FUEL CELL	...NONE...	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

FREE FLYING RSRCH AND APPL. NSS-11 06/11/71

MISS. OBJ. FREE-FLYING EXPERIMENT MODULE

PAYLOAD CURR.EXP.	PROGRAM N SPA STAT	AGENCY NASA	NO SATS 1	CHAR VELOC 2.6200E+04	CIRC ALTIT 270.0	NOM INCLIN 55.00	NOM APOG 270.0	NOM PERIG 270.0
NOM ECCENT 0.	MAX APOG *NO ENTRY*	MIN APOG *NO ENTRY*	MAX PERIG *NO ENTRY*	MIN PERIG *NO ENTRY*	MAX INCLIN *NO ENTRY*	MIN INCLIN *NO ENTRY*	LCH WINDOW *NO ENTRY*	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT *NO ENTRY*	FLTS 1979 *NO ENTRY*	FLTS 1980 *NO ENTRY*	FLTS 1981 *NO ENTRY*	FLTS 1982 *NO ENTRY*	FLTS 1983 *NO ENTRY*	FLTS 1984 *NO ENTRY*	FLTS 1985 *NO ENTRY*
FLTS 1986 *NO ENTRY*	FLTS 1987 *NO ENTRY*	FLTS 1988 *NO ENTRY*	FLTS 1989 *NO ENTRY*	FLTS 1990 *NO ENTRY*	TOTAL FLTS *NO ENTRY*	SYS LF 2	MEAN MISS .3300	TYPE MNT R *NO ENTRY*
EXP MNT PH SPCE-ERTH	MAX PLD VS *NO ENTRY*	MIN PLD VS *NO ENTRY*	LCH VOLUME 8928	LCH LENGTH 58.00	LCH DIAM 14.00	SENSOR 1 MAN	SENSOR 2 *NO ENTRY*	SENSOR 3 *NO ENTRY*
SENSOR 4 *NO ENTRY*	SENSOR 5 *NO ENTRY*	POINT ACC 2 SEC	AV PWR 1.0000E+04	ST M V A W 7222	ENV CONT W 1688	GD NA ST W 1457	PROPULS W 0	P PROPEL W 0
ATT CONT W 2776	A.C.PROP. 1910	TTC W 284	ELEC W 1443	MISS EQ W 5130	TOTAL D W 18090	TO W IN EX 20000	ADAPTER W 0	LAUNCH W 20000
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

22 FT DIA SPACE STATION-1 NSS-15A

MISS. OBJ. LONG-TERM MANNED SPACE OPERATIONS - INITIAL 6 MAN STATION 06/11/71

PAYLOAD CURR.EXP.	PROGRAM N SPA STA	AGENCY NASA	NO SATS 1	CHAR VELOC 2.6200E+04	CIRC ALTIT 270.0	NOM INCLIN 55.00	NOM APOG 270.0	NOM PERIG 270.0
NOM ECCENT 0.	MAX APOG 270.0	MIN APOG 270.0	MAX PERIG 270.0	MIN PERIG 270.0	MAX INCLIN 55.00	MIN INCLIN 55.00	LCH WINDOW *NO ENTRY*	LCH VEH 1 INT-21
LCH SITE 1 ETR	IN LCH DAT 1981	FLTS 1979 0	FLTS 1980 0	FLTS 1981 1	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 1	SYS LF 10	MEAN MISS .3300	TYPE MNT R MAINT.
EXP MNT PH ORB.MAINT.	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 15966	LCH LENGTH 42.00	LCH DIAM 22.00	SENSOR 1 MAN	SENSOR 2 ERTH.RESC.	SENSOR 3 ASTRNOMY
SENSOR 4 LIFE SCI.	SENSOR 5 MAT.SCI.	POINT ACC 0.25 DEG	AV PWR 1.5000E+04	ST M V A W 26501	ENV CONT W 6077	GD NA ST W 770	PROPULS W 0	P PROPEL W 0
ATT CONT W 702	A.C.PROP. 317	TTC W 3098	ELEC W 10266	MISS EQ W 11211	TOTAL D W 58308	TO W IN EX 58625	ADAPTER W 2075	LAUNCH W 60700
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. LONG-TERM MANNED SPACE OPERATIONS - FORMING 12 MAN STATION WHEN DOCKED TO INITIAL 6 MAN STATION

PAYLOAD CURR.EXP.	PROGRAM N SPA STA	AGENCY NASA	NO SATS 1	CHAR VELOC 2.6200E+04	CIRC ALTIT 270.0	NOM INCLIN 55.00	NOM APOG 270.0	NOM PERIG 270.0
NOM ECCENT 0.	MAX APOG 270.0	MIN APOG 270.0	MAX PERIG 270.0	MIN PERIG 270.0	MAX INCLIN 55.00	MIN INCLIN 55.00	LCH WINDOW *NO ENTRY*	LCH VEH 1 INT-21
LCH SITE 1 ETR	IN LCH DAT 1985	FLTS 1979 0	FLTS 1980 0	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 1
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 1	SYS LF 10	MEAN MISS .3300	TYPE MNT R MAINT.
EXP MNT PH ORB.MAINT.	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 24709	LCH LENGTH 65.00	LCH DIAM 22.00	SENSOR 1 MAN	SENSOR 2 ERTH.RESC.	SENSOR 3 ASTRNOMY
SENSOR 4 LIFE SCI.	SENSOR 5 MAT.SCI.	POINT ACC *NO ENTRY*	AV PWR 2.9000E+04	ST M V A W 25470	ENV CONT W 5702	GD NA ST W 156	PROPULS W 0	P PROPEL W 0
ATT CONT W 271	A.C.PROP. 181	TTC W 2106	ELEC W 8888	MISS EQ W 6680	TOTAL D W 49092	TO W IN EX 49273	ADAPTER W 1527	LAUNCH W 50800
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

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Table A4-2. NASA and Non-NASA Current Reusable Payload Data

Index of Defined Satellites

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MISS. OBJ. EXTEND SPACE ASTRONOMY CAPABILITY TO DIFFRACTION LIMITED 3 M DIA. OPTICAL TECHNOLOGY. HIGH RESOLUTION SPECTRONOMY AND IMAGING OF PLANETARY BODIES.

PAYLOAD CURR.REUSE	PROGRAM N ASTRNOMY	AGENCY NASA	NO SATS 1	CHAR VELOC 2.6480E+04	CIRC ALTIT 350.0	NOM INCLIN 28.50	NOM APOG 350.0	NOM PERIG 350.0
NOM ECCENT 0.	MAX APOG 450.0	MIN APOG 250.0	MAX PERIG 450.0	MIN PERIG 250.0	MAX INCLIN 55.00	MIN INCLIN 28.50	LCH WINDOW ...NONE...	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1981	FLTS 1979 0	FLTS 1980 0	FLTS 1981 1	FLTS 1982 0	FLTS 1983 1	FLTS 1984 0	FLTS 1985 1
FLTS 1986 0	FLTS 1987 1	FLTS 1988 0	FLTS 1989 1	FLTS 1990 0	TOTAL FLTS 5	SYS LF 10	MEAN MISS 1.000	TYPE MNT R MAINT.
EXP MNT PH RPL.EXP.	MAX PLD VS 5000	MIN PLD VS 5000	LCH VOLUME 6106	LCH LENGTH 46.00	LCH DIAM 13.00	SENSOR 1 TV CAMERA	SENSOR 2 PHTO CAMRA	SENSOR 3 SPCTRPHTO
SENSOR 4 SPCTRSCPE	SENSOR 5 POLRMTRY	POINT ACC 1.0 SEC	AV PWR 1500	ST M V A W 8650	ENV CONT W 1300	GD NA ST W 770	PROPULS W 0	P PROPEL W 0
ATT CONT W 345	A.C.PROP. 160	TTC W 500	ELEC W 1310	MISS EQ W 8270	TOTAL D W 20985	TO W IN EX 21145	ADAPTER W 0	LAUNCH W 21145
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

LARGE SOLAR OBSERVATORY NAS-28 06/11/71

MISS. OBJ. CONDUCT HIGH RESOLUTION VISUAL AND UV STUDIES OF SOLAR GRANULAR STRUCTURE AND AREAS OF HIGH SOLAR ACTIVITIES. CONTINUE UV AND X-RAY OBSERVATIONS WITH HIGHER SPATIAL AND SPECTRAL RESOLUTIONS (MAN MAINT.)

PAYLOAD CURR.REUSE	PROGRAM N ASTRNOMY	AGENCY NASA	NO SATS 1	CHAR VELOC 2.6480E+04	CIRC ALTIT 350.0	NOM INCLIN 30.00	NOM APOG 350.0	NOM PERIG 350.0
NOM ECCENT 0.	MAX APOG 400.0	MIN APOG 300.0	MAX PERIG 400.0	MIN PERIG 300.0	MAX INCLIN 55.00	MIN INCLIN 28.50	LCH WINDOW ...NONE...	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1983	FLTS 1979 0	FLTS 1980 0	FLTS 1981 0	FLTS 1982 0	FLTS 1983 1	FLTS 1984 0	FLTS 1985 1
FLTS 1986 0	FLTS 1987 1	FLTS 1988 0	FLTS 1989 1	FLTS 1990 0	TOTAL FLTS 4	SYS LF 10	MEAN MISS 1.000	TYPE MNT R IVA MAINT.
EXP MNT PH RPL.EXP.	MAX PLD VS 1.0000E+04	MIN PLD VS 1.0000E+04	LCH VOLUME 10249	LCH LENGTH 58.00	LCH DIAM 15.00	SENSOR 1 TELESCOPE	SENSOR 2 UV SPECTR.	SENSOR 3 CORONGRPH
SENSOR 4 SPCTRGRPH	SENSOR 5 SLR.MAG.FD	POINT ACC 0.1 SEC	AV PWR 1500	ST M V A W 9681	ENV CONT W 2262	GD NA ST W 1953	PROPULS W 0	P PROPEL W 0
ATT CONT W 2441	A.C.PROP. 1280	TTC W 381	ELEC W 1934	MISS EQ W 6875	TOTAL D W 24247	TO W IN EX 25527	ADAPTER W 0	LAUNCH W 25527
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3 AXIS	TYPE EP SOLAR	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

LARGE RADIO OBSERVATORY NAS-3 06/11/71

MISS. OBJ. UNDERSTAND PHYSICAL PROCESSES IN THE SOLAR CORONA AND IN THE MAGNETOSPHERES OF THE PLANETS, ESPECIALLY JUPITER AND EARTH.

PAYLOAD CURR.REUSE	PROGRAM N ASTRNOMY	AGENCY NASA	NO SATS 1	CHAR VELOC 2.6480E+04	CIRC ALTIT 350.0	NOM INCLIN 30.00	NOM APOG 350.0	NOM PERIG 350.0
NOM ECCENT 0.	MAX APOG 350.0	MIN APOG 350.0	MAX PERIG 350.0	MIN PERIG 350.0	MAX INCLIN 55.00	MIN INCLIN 28.50	LCH WINDOW ...NONE...	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1985	FLTS 1979 0	FLTS 1980 0	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 1
FLTS 1986 0	FLTS 1987 1	FLTS 1988 0	FLTS 1989 1	FLTS 1990 0	TOTAL FLTS 3	SYS LF 10	MEAN MISS 1.000	TYPE MNT R MAINT.
EXP MNT PH RPL.EXP.	MAX PLD VS 3500	MIN PLD VS 3500	LCH VOLUME 4772	LCH LENGTH 31.00	LCH DIAM 14.00	SENSOR 1 BOLOMETER	SENSOR 2 ELF DETECT	SENSOR 3 VHF DETECT
SENSOR 4 UHF DETECT	SENSOR 5 MICROWAVE	POINT ACC 1.0 SEC	AV PWR 2000	ST M V A W 3000	ENV CONT W 1000	GD NA ST W 2000	PROPULS W 0	P PROPEL W 0
ATT CONT W 650	A.C.PROP. 350	TTC W 700	ELEC W 1600	MISS EQ W 10000	TOTAL D W 18600	TO W IN EX 18950	ADAPTER W 0	LAUNCH W 18950
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3 AXIS	TYPE EP SOLAR	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

HIGH ENERGY ASTRONOMY OBSERVAT NAS-4 06/11/71

MISS. OBJ. TO PERFORM A SURVEY OF THE CELESTIAL SPHERE WITH PRIMARY EMPHASIS ON THE GALACTIC BELT REGION. SECONDARY OBJECTIVE IS POINTING AT SPECIFIC CELESTIAL TARGET.

PAYLOAD CURR.REUSE	PROGRAM N ASTRNOMY	AGENCY NASA	NO SATS 1	CHAR VELOC 2.6000E+04	CIRC ALTIT 200.0	NOM INCLIN 30.00	NOM APOG 200.0	NOM PERIG 200.0
NOM ECCENT 0.	MAX APOG 230.0	MIN APOG 170.0	MAX PERIG 230.0	MIN PERIG 170.0	MAX INCLIN 28.50	MIN INCLIN 28.50	LCH WINDOW ...NONE...	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1979	FLTS 1979 1	FLTS 1980 0	FLTS 1981 1	FLTS 1982 0	FLTS 1983 1	FLTS 1984 0	FLTS 1985 1
FLTS 1986 0	FLTS 1987 1	FLTS 1988 0	FLTS 1989 1	FLTS 1990 0	TOTAL FLTS 6	SYS LF 10	MEAN MISS 1.000	TYPE MNT R MAINT.
EXP MNT PH RPL.EXP.	MAX PLD VS 3500	MIN PLD VS 3500	LCH VOLUME 4847	LCH LENGTH 51.00	LCH DIAM 11.00	SENSOR 1 X-RAY DET	SENSOR 2 G-RAY DET	SENSOR 3 G-RAY TELE
SENSOR 4 C-RAY DET	SENSOR 5 C-RAY CALR	POINT ACC 0.1 DEG	AV PWR 820.0	ST M V A W 3000	ENV CONT W 500	GD NA ST W 1500	PROPULS W 0	P PROPEL W 0
ATT CONT W 650	A.C.PROP. 350	TTC W 700	ELEC W 1780	MISS EQ W 12270	TOTAL D W 20050	TO W IN EX 20400	ADAPTER W 0	LAUNCH W 20400
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

ASTRONOMY EXPLORER NAS-14A 06/11/71

MISS. OBJ. INDEPENDENT INVESTIGATIONS OF SOLAR AND STELLAR BEHAVIOR IN THE UV, X-RAY AND RADIO SPECTRAL REGIONS. NOT PART OF OBSERVATORY.

PAYLOAD CURR.REUSE	PROGRAM N ASTRNOMY	AGENCY NASA	NO SATS 1	CHAR VELOC 2.6200E+04	CIRC ALTIT 270.0	NOM INCLIN 28.50	NOM APOG 270.0	NOM PERIG 270.0
NOM ECCENT 0.	MAX APOG 270.0	MIN APOG 270.0	MAX PERIG 270.0	MIN PERIG 270.0	MAX INCLIN 28.50	MIN INCLIN 28.50	LCH WINDOW ...NONE...	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1979	FLTS 1979 2	FLTS 1980 0	FLTS 1981 1	FLTS 1982 2	FLTS 1983 2	FLTS 1984 1	FLTS 1985 0
FLTS 1986 2	FLTS 1987 1	FLTS 1988 2	FLTS 1989 2	FLTS 1990 0	TOTAL FLTS 15	SYS LF 3	MEAN MISS 3.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 141	LCH LENGTH 5.000	LCH DIAM 6.000	SENSOR 1 TV CAMERA	SENSOR 2 UHF DETECT	SENSOR 3 C-RAY DET
SENSOR 4 VN ALN DET	SENSOR 5 LASER	POINT ACC 10 SEC	AV PWR 100.0	ST M V A W 363	ENV CONT W 15	GD NA ST W 70	PROPULS W 110	P PROPEL W 80
ATT CONT W 34	A.C.PROP. 20	TTC W 50	ELEC W 161	MISS EQ W 250	TOTAL D W 953	TO W IN EX 1053	ADAPTER W 0	LAUNCH W 1053
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE GN2	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

ASTRONOMY EXPLORER NAS-14B

06/11/71

MISS. OBJ. INDEPENDENT INVESTIGATIONS OF SOLAR AND STELLAR BEHAVIOR IN THE UV, X-RAY AND RADIO SPECTRAL REGIONS. NOT PART OF OBSERVATORY.

PAYLOAD CURR.REUSE	PROGRAM N ASTRNOMY	AGENCY NASA	NO SATS 1	CHAR VELOC 3.9700E+04	CIRC ALTIT 1.9323E+04	NOM INCLIN 0.	NOM APOG 1.9323E+04	NOM PERIG 1.9323E+04
NOM ECCENT 0.	MAX APOG 1.9323E+04	MIN APOG 1.9323E+04	MAX PERIG 1.9323E+04	MIN PERIG 1.9323E+04	MAX INCLIN 0.	MIN INCLIN 0.	LCH WINDOW ...NONE...	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1980	FLTS 1979 0	FLTS 1980 2	FLTS 1981 1	FLTS 1982 0	FLTS 1983 0	FLTS 1984 1	FLTS 1985 2
FLTS 1986 0	FLTS 1987 1	FLTS 1988 0	FLTS 1989 0	FLTS 1990 2	TOTAL FLTS 9	SYS LF 3	MEAN MISS 3.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 141	LCH LENGTH 5.000	LCH DIAM 6.000	SENSOR 1 TV CAMERA	SENSOR 2 UHF DETECT	SENSOR 3 C-RAY DET
SENSOR 4 VN ALN DET	SENSOR 5 LASER	POINT ACC 10 SEC	AV PWR 100.0	ST M V A W 363	ENV CONT W 15	GD NA ST W 70	PROPULS W 110	P PROPEL W 80
ATT CONT W 34	A.C.PROP. 20	TTC W 50	ELEC W 161	MISS EQ W 250	TOTAL D W 953	TO W IN EX 1053	ADAPTER W 0	LAUNCH W 1053
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE GN2	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK TUG	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

LOWER MAGNETOSPHERE NSP-1 06/11/71

MISS. OBJ. TO CONDUCT INVESTIGATIONS OF THE ENVIRONMENT OF THE LOWER MAGNETOSPHERE, NEUTRAL AIR CHEMISTRY AND DENSITY AND IONOSPHERIC BEHAVIOR.

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
CURR.REUSE	N SPA PHYS	NASA	1	2.8000E+04	...NONE...	...NONE...	2000	100.0
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
.2110	2100	1900	100.0	100.0	90.00	28.50	...NONE...	SHUTTLE
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
ETR	1979	1	1	1	1	1	1	1
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
1	1	1	1	1	12	3	1.000	...NONE...
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
...NONE...	0.	0.	254	9.000	6.000	UV DETECT	CURR.COLL	VLF RECVRS
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
MASS SPECT	MAGNETOMET	2 DEG	100.0	450	30	110	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
520	450	100	90	100	950	1400	0	1400
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
EXO	LIQUID	HYDRAZINE	SPIN	SOLAR	TUG	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

MISS. OBJ. TO MEASURE IONOSPHERIC CURRENT SYSTEMS AND BEHAVIOR WITH RESPECT TO SOLAR ACTIVITY, ALSO NEUTRAL ATMOSPHERE STUDIES.

PAYLOAD CURR.REUSE	PROGRAM N SPA PHYS	AGENCY NASA	NO SATS 1	CHAR VELOC 3.6301E+04	CIRC ALTIT ...NONE...	NOM INCLIN ...NONE...	NOM APOG 6.0000E+04	NOM PERIG 100.0
NOM ECCENT .8950	MAX APOG 6.0000E+04	MIN APOG 2.0000E+04	MAX PERIG 1000	MIN PERIG 100.0	MAX INCLIN 90.00	MIN INCLIN 28.50	LCH WINDOW ...NONE...	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1979	FLTS 1979 1	FLTS 1980 1	FLTS 1981 1	FLTS 1982 1	FLTS 1983 1	FLTS 1984 1	FLTS 1985 1
FLTS 1986 1	FLTS 1987 1	FLTS 1988 1	FLTS 1989 1	FLTS 1990 1	TOTAL FLTS 12	SYS LF 3	MEAN MISS 1.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 299	LCH LENGTH 9.000	LCH DIAM 6.500	SENSOR 1 SLD-ST DET	SENSOR 2 ION-CR MON	SENSOR 3 ELE-CR MON
SENSOR 4 PHTOMULTIP	SENSOR 5 SCINT.CNT	POINT ACC 2 DEG	AV PWR 100.0	ST M V A W 395	ENV CONT W 30	GD NA ST W 100	PROPULS W 0	P PROPEL W 0
ATT CONT W 360	A.C.PROP. 300	TTC W 100	ELEC W 90	MISS EQ W 100	TOTAL D W 875	TO W IN EX 1175	ADAPTER W 0	LAUNCH W 1175
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C SPIN	TYPE EP SOLAR	TYPE KICK TUG	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

GENERAL RELATIVITY

NSP-6

06/11/71

MISS. OBJ. TO EXPERIMENTALLY TEST EINSTEINS GENERAL RELATIVITY THEORY. GYROSCOPES IN AN EARTH-ORBITING SATELLITE WILL EXPERIENCE TWO RELATIVISTIC PRECESSION EFFECTS.

PAYLOAD CURR.REUSE	PROGRAM N SPA PHYS	AGENCY NASA	NO SATS 1	CHAR VELOC 2.6300E+04	CIRC ALTIT 300.0	NOM INCLIN 90.00	NOM APOG 300.0	NOM PERIG 300.0
NOM ECCENT 0.	MAX APOG 350.0	MIN APOG 300.0	MAX PERIG 350.0	MIN PERIG 300.0	MAX INCLIN 95.00	MIN INCLIN 85.00	LCH WINDOW ...NONE...	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1984	FLTS 1979 0	FLTS 1980 0	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 1	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 1	TOTAL FLTS 2	SYS LF 1	MEAN MISS 1.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 226	LCH LENGTH 8.000	LCH DIAM 6.000	SENSOR 1 GYRO	SENSOR 2 CHG.PART.	SENSOR 3 IR
SENSOR 4 MAGNETOMET	SENSOR 5 *NO ENTRY*	POINT ACC 1 SEC	AV PWR 700.0	ST M V A W 455	ENV CONT W 50	GD NA ST W 180	PROPULS W 0	P PROPEL W 0
ATT CONT W 100	A.C.PROP. 80	TTC W 120	ELEC W 480	MISS EQ W 350	TOTAL D W 1655	TO W IN EX 1735	ADAPTER W 0	LAUNCH W 1735
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE GN2	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

POLAR EARTH OBSERVATION SATELL NEO-2 06/11/71

MISS. OBJ. TO DESIGN, DEVELOP AND OPERATE A SPACE OBSERVATORY SYSTEM TO PERFORM METEOROLOGICAL AND EARTH RESOURCES SURVEYING BY ADVANCED REMOTE SENSING TECHNIQUES.

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
CURR.REUSE	N EAR OBS	NASA	1	2.6950E+04	500.0	100.0	500.0	500.0
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
0.	550.0	450.0	550.0	450.0	102.0	90.00	...NONE...	SHUTTLE
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
WTR	1979	1	1	1	1	1	1	1
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
1	1	1	1	1	12	2	2.000	...NONE...
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
...NONE...	0.	0.	1963	16.00	12.50	MICROWAVE	IR RADIO	RADAR SCAT
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
IR SCANNER	OPTICS	.07 DEG	600.0	788	60	230	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
240	160	180	600	850	2788	2948	0	2948
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
EXO	LIQUID	HYDRAZINE	3 AXIS	SOLAR	...NONE...	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

SYNCHRONOUS EARTH OBSERVATION NEO-3 06/11/71

MISS. OBJ. RESEARCH SATELLITE TO INVESTIGATE AND DEVELOP REMOTE SENSING TECHNIQUES FOR MEASUREMENT OF THE EARTHS SURFACE AND ATMOSPHERE FROM SYNC ALTITUDE.

PAYLOAD CURR.REUSE	PROGRAM N EAR OBS	AGENCY NASA	NO SATS 1	CHAR VELOC 3.9700E+04	CIRC ALTIT 1.9323E+04	NOM INCLIN 0.	NOM APOG 1.9323E+04	NOM PERIG 1.9323E+04
NOM ECCENT 0.	MAX APOG 1.9323E+04	MIN APOG 1.9323E+04	MAX PERIG 1.9323E+04	MIN PERIG 1.9323E+04	MAX INCLIN 0.	MIN INCLIN 0.	LCH WINDOW ...NONE...	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1980	FLTS 1979 0	FLTS 1980 1	FLTS 1981 0	FLTS 1982 1	FLTS 1983 0	FLTS 1984 1	FLTS 1985 0
FLTS 1986 1	FLTS 1987 0	FLTS 1988 1	FLTS 1989 0	FLTS 1990 1	TOTAL FLTS 6	SYS LF 2	MEAN MISS 2.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 198	LCH LENGTH 7.000	LCH DIAM 6.000	SENSOR 1 EAR.SENS.	SENSOR 2 METEOR.SEN	SENSOR 3 IR SCAN
SENSOR 4 SPECTROM	SENSOR 5 MICROWAVE	POINT ACC 10 SEC	AV PWR 400.0	ST M V A W 334	ENV CONT W 20	GD NA ST W 95	PROPULS W 0	P PROPEL W 0
ATT CONT W 120	A.C.PROP. 80	TTC W 95	ELEC W 200	MISS EQ W 350	TOTAL D W 1134	TO W IN EX 1214	ADAPTER W 0	LAUNCH W 1214
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK TUG	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

SYNCHRONOUS EARTH RESOURCES SA NEO-4 06/11/71

MISS. OBJ. TO DESIGN, DEVELOP AND OPERATE A SATELLITE SYSTEM FOR REMOTE SENSING OF THE EARTHS SURFACE AND THE LOWER REGIONS OF THE ATMOSPHERE FROM SYNCHRONOUS ORBITAL ALTITUDES.

PAYLOAD CURR.REUSE	PROGRAM N EAR OBS	AGENCY NASA	NO SATS 4	CHAR VELOC 3.9700E+04	CIRC ALTIT 1.9323E+04	NOM INCLIN 0.	NOM APOG 1.9323E+04	NOM PERIG 1.9323E+04
NOM ECCENT 0.	MAX APOG 1.9323E+04	MIN APOG 1.9323E+04	MAX PERIG 1.9323E+04	MIN PERIG 1.9323E+04	MAX INCLIN 0.	MIN INCLIN 0.	LCH WINDOW ...NONE...	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1981	FLTS 1979 0	FLTS 1980 0	FLTS 1981 1	FLTS 1982 2	FLTS 1983 1	FLTS 1984 0	FLTS 1985 0
FLTS 1986 0	FLTS 1987 1	FLTS 1988 2	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 7	SYS LF 2	MEAN MISS 2.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 198	LCH LENGTH 7.000	LCH DIAM 6.000	SENSOR 1 IR SCANNER	SENSOR 2 RADIOMETER	SENSOR 3 MICROWAVE
SENSOR 4 IMAG.SPEC.	SENSOR 5 SPECTRUM	POINT ACC 10 SEC	AV PWR 400.0	ST M V A W 334	ENV CONT W 20	GD NA ST W 95	PROPULS W 0	P PROPEL W 0
ATT CONT W 120	A.C.PROP. 80	TTC W 95	ELEC W 200	MISS EQ W 350	TOTAL D W 1134	TO W IN EX 1214	ADAPTER W 0	LAUNCH W 1214
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK TUG	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

EARTH PHYSICS SATELLITE NEO-5 06/11/71

MISS. OBJ. TO MAKE PRECISION MEASUREMENTS OF THE EARTHS LAND AND SEA AREAS TO DETERMINE -1- CONTINENTAL DRIFT, -2- MASS DISTRIBUTION, -3- SURFACE STRAIN, AND -4- VARIATION OF GRAVITY, SEA ALTITUDE, AND MASS.

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
CURR.REUSE	N EAR OBS	NASA	1	2.6600E+04	700.0	90.00	700.0	700.0
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
0.	1000	400.0	1000	400.0	103.0	80.00	...NONE...	SHUTTLE
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
WTR	1980	0	1	1	1	1	0	1
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
0	1	0	1	0	7	2	2.000	...NONE...
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
...NONE...	0.	0.	212	7.500	6.000	MICROWAVE	LASERS	IMAG.DISS
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
NO ENTRY	*NO ENTRY*	1 SEC	200.0	200	10	60	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
80	50	60	170	150	680	730	0	730
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
EXO	LIQUID	HYDRAZINE	3-AXIS	SOLAR	TUG	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

MISS. OBJ. SYSTEM DEMONSTRATION OF THE 4TH GENERATION SERIES OF OPERATIONAL METEOROLOGICAL SATELLITE FOR DOC/ESSA.

PAYLOAD CURR.REUSE	PROGRAM N EAP OBS	AGENCY NASA	NO SATS 1	CHAR VELOC 2.7500E+04	CIRC ALTIT 700.0	NOM INCLIN 100.0	NOM APOG 700.0	NOM PERIG 700.0
NOM ECCENT 0.	MAX APOG 750.0	MIN APOG 650.0	MAX PERIG 750.0	MIN PERIG 650.0	MAX INCLIN 103.0	MIN INCLIN 97.00	LCH WINDOW *NO ENTRY*	LCH VEH 1 SHUTTLE
LCH SITE 1 WTR	IN LCH DAT 1981	FLTS 1979 0	FLTS 1980 0	FLTS 1981 1	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 1
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 1	TOTAL FLTS 3	SYS LF 5	MEAN MISS 5.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 311	LCH LENGTH 11.00	LCH DIAM 6.000	SENSOR 1 RADIOMETER	SENSOR 2 SCAN.RADIO	SENSOR 3 TEMP.RADIO
SENSOR 4 *NO ENTRY*	SENSOR 5 *NO ENTRY*	POINT ACC ...NONE...	AV PWR 200.0	ST M V A W 384	ENV CONT W 20	GD NA ST W 95	PROPULS W 0	P PROPEL W 0
ATT CONT W 110	A.C.PROP. 80	TTC W 90	ELEC W 270	MISS EQ W 245	TOTAL D W 1134	TO W IN EX 1214	ADAPTER W 0	LAUNCH W 1214
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK TUG	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

TOS METEOROLOGICAL SATELLITE NEO-7 06/11/71

MISS. OBJ. OBSERVE GLOBAL CLOUDS, DAY AND NIGHT, CLOUD TOP HEIGHTS, HEAT BALANCE, VERTICAL TEMPERATURES AND WATER VAPOR PROFILES.

PAYLOAD CURR.REUSE	PROGRAM OPERAT.SC.	AGENCY NON NASA	NO SATS 3	CHAR VELOC 2.7500E+04	CIRC ALTIT 700.0	NOM INCLIN 100.0	NOM APOG 700.0	NOM PERIG 700.0
NOM ECCENT 0.	MAX APOG 700.0	MIN APOG 700.0	MAX PERIG 700.0	MIN PERIG 700.0	MAX INCLIN 103.0	MIN INCLIN 97.00	LCH WINDOW ...NONE...	LCH VEH 1 SHUTTLE
LCH SITE 1 WTR	IN LCH DAT 1979	FLTS 1979 1	FLTS 1980 1	FLTS 1981 1	FLTS 1982 1	FLTS 1983 1	FLTS 1984 1	FLTS 1985 1
FLTS 1986 1	FLTS 1987 1	FLTS 1988 1	FLTS 1989 1	FLTS 1990 1	TOTAL FLTS 12	SYS LF 12	MEAN MISS 4.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 198	LCH LENGTH 7.000	LCH DIAM 6.000	SENSOR 1 BOLOMETERS	SENSOR 2 TV CAMERA	SENSOR 3 VIDICON
SENSOR 4 *NO ENTRY*	SENSOR 5 *NO ENTRY*	POINT ACC ...NONE...	AV PWR 200.0	ST M V A W 384	ENV CONT W 20	GD NA ST W 90	PROPULS W 0	P PROPEL W 0
ATT CONT W 110	A.C.PROP. 80	TTC W 90	ELEC W 270	MISS EQ W 250	TOTAL D W 1134	TO W IN EX 1214	ADAPTER W 0	LAUNCH W 1214
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK TUG	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

SYNCHRONOUS EARTH RESOURCES NEO-11 06/11/71

MISS. OBJ. OPERATIONAL REMOTE SENSING AND MEASUREMENT OF THE EARTHS RESOURCES AND LOWER ATMOSPHERE.

PAYLOAD CURR.REUSE	PROGRAM OPERAT.SC.	AGENCY NON NASA	NO SATS 4	CHAR VELOC 3.9700E+04	CIRC ALTIT 1.9323E+04	NOM INCLIN 0.	NOM APOG 1.9323E+04	NOM PERIG 1.9323E+04
NOM ECCENT 0.	MAX APOG 1.9323E+04	MIN APOG 1.9323E+04	MAX PERIG 1.9323E+04	MIN PERIG 1.9323E+04	MAX INCLIN 0.	MIN INCLIN 0.	LCH WINDOW *NO ENTRY*	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1985	FLTS 1979 0	FLTS 1980 0	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 4
FLTS 1986 0	FLTS 1987 0	FLTS 1988 4	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 8	SYS LF 6	MEAN MISS 3.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 232	LCH LENGTH 7.000	LCH DIAM 6.500	SENSOR 1 TV CAMERA	SENSOR 2 IR	SENSOR 3 MICROWAVE
SENSOR 4 RADAR	SENSOR 5 *NO ENTRY*	POINT ACC 10 SEC	AV PWR 400.0	ST M V A W 334	ENV CONT W 20	GD NA ST W 95	PROPULS W 0	P PROPEL W 0
ATT CONT W 120	A.C.PROP. 80	TTC W 95	ELEC W 200	MISS EQ W 350	TOTAL D W 1134	TO W IN EX 1214	ADAPTER W 0	LAUNCH W 1214
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK TUG	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. OPERATIONAL METEOROLOGICAL SATELLITE OPERATING FROM SYNCHRONOUS ALTITUDE FOR ESSA.

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
CURR.REUSE	OPERAT.SC.	NON NASA	2	3.9700E+04	1.9323E+04	0.	1.9323E+04	1.9323E+04
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
0.	1.9323E+04	1.9323E+04	1.9323E+04	1.9323E+04	0.	0.	*NO ENTRY*	SHUTTLE
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
ETR	1979	1	1	1	1	1	1	1
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
1	1	1	1	1	12	12	2.000	...NONE...
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
...NONE...	0.	0.	254	9.000	6.000	VIS.SCANNR	IR SCANNER	ENVIR.MON
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
DATA COLL	RELAY CAP.	10 SEC	300.0	345	30	100	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
140	90	100	250	250	1125	1215	0	1215
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
EXO	LIQUID	HYDRAZINE	3-AXIS	SOLAR	TUG	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

POLAR EARTH RESOURCES NEO-16 06/11/71

MISS. OBJ. OPERATIONAL SATELLITE TO CONTINUALLY SURVEY EARTH RESOURCES AND TO PERFORM METEOROLOGICAL SURVEY WITH HIGH RESOLUTION SENSOR AND TRANSMITTING DATA TO EARTH.

PAYLOAD CURR.REUSE	PROGRAM OPERAT.SC.	AGENCY NON NASA	NO SATS 4	CHAR VELOC 2.6950E+04	CIRC ALTIT 500.0	NOM INCLIN 100.0	NOM APOG 500.0	NOM PERIG 500.0
NOM ECCENT 0.	MAX APOG 550.0	MIN APOG 450.0	MAX PERIG 550.0	MIN PERIG 450.0	MAX INCLIN 103.0	MIN INCLIN 97.00	LCH WINDOW *NO ENTRY*	LCH VEH 1 SHUTTLE
LCH SITE 1 WTR	IN LCH DAT 1979	FLTS 1979 4	FLTS 1980 0	FLTS 1981 4	FLTS 1982 0	FLTS 1983 4	FLTS 1984 0	FLTS 1985 4
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 6	FLTS 1990 0	TOTAL FLTS 22	SYS LF 12	MEAN MISS 2.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 431	LCH LENGTH 13.00	LCH DIAM 6.500	SENSOR 1 IMAG.RADIO	SENSOR 2 IR RADIO	SENSOR 3 MICROWAVE
SENSOR 4 RAD.SCANNR	SENSOR 5 IR SCANNER	POINT ACC .04 DEG	AV PWR 600.0	ST M V A W 788	ENV CONT W 60	GD NA ST W 230	PROPULS W 0	P PROPEL W 0
ATT CONT W 240	A.C.PROP. 160	TTC W 180	ELEC W 600	MISS EQ W 850	TOTAL D W 2788	TO W IN EX 2948	ADAPTER W 0	LAUNCH W 2948
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK ...NONE...	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

APPLICATION TECHNOLOGY SAT. NCN-1 06/11/71

MISS. OBJ. EARTH TO GEO-STATIONARY ORBIT COMMUNICATION POWER, HIGH GAIN MULTI-BEAM SATELLITE ANTENNA, GENERAL APPLICATION TECHNOLOGY(METEOROLOGY,EARTH OBSERVATIONS,ETC.)

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
CURR.REUSE	N COM NAV	NASA	1	3.9700E+04	1.9323E+04	0.	1.9323E+04	1.9323E+04
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
0.	1.9323E+04	1.9323E+04	1.9323E+04	1.9323E+04	1.000	-1.000	*NO ENTRY*	SHUTTLE
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
ETR	1979	1	0	1	0	1	1	0
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
1	0	1	1	0	7	5	5.000	MNT
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
REFUR/REP	50.00	10.00	3888	22.00	15.00	HF SENSOR	VHF SENSOR	ANTENNA
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
NO ENTRY	*NO ENTRY*	0.05 DEG	8000	2464	300	1030	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
550	400	400	2900	1600	8844	9244	0	9244
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
ENDO	LIQUID	HYDRAZINE	3 AXIS	SOLAR NUC	TUG	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

SMALL APPLIC. TECHNOLOGY NCN-2A 06/11/71

MISS. OBJ. TO DESIGN, DEVELOP, LAUNCH, AND OPERATE A SERIES OF SMALL R AND D SATELLITES FOR THE EXPERIMENTAL APPLICATION OF RESEARCH AND TECHNOLOGY DEVELOPMENTS IN SPACECRAFT AND SENSOR SUBSYSTEMS.

PAYLOAD CURR.REUSE	PROGRAM N COM NAV	AGENCY NASA	NO SATS 1	CHAR VELOC 2.9400E+04	CIRC ALTIT ...NONE...	NOM INCLIN 90.00	NOM APOG 3000	NOM PERIG 300.0
NOM ECCENT 0.	MAX APOG 3000	MIN APOG 3000	MAX PERIG 310.0	MIN PERIG 280.0	MAX INCLIN 90.00	MIN INCLIN 0.	LCH WINDOW *NO ENTRY*	LCH VEH 1 SHUTTLE
LCH SITE 1 WTR	IN LCH DAT 1979	FLTS 1979 1	FLTS 1980 1	FLTS 1981 1	FLTS 1982 1	FLTS 1983 1	FLTS 1984 1	FLTS 1985 1
FLTS 1986 1	FLTS 1987 1	FLTS 1988 1	FLTS 1989 1	FLTS 1990 1	TOTAL FLTS 12	SYS LF 1	MEAN MISS 1.000	TYPE MNT R *NO ENTRY*
EXP MNT PH ...NONE...	MAX PLD VS *NO ENTRY*	MIN PLD VS *NO ENTRY*	LCH VOLUME 500	LCH LENGTH 13.00	LCH DIAM 7.000	SENSOR 1 TV CAMERA	SENSOR 2 IR	SENSOR 3 LASER
SENSOR 4 CHG.COLL	SENSOR 5 NANO-G	POINT ACC 10 SEC	AV PWR 500.0	ST M V A W 238	ENV CONT W 10	GD NA ST W 55	PROPULS W 0	P PROPEL W 0
ATT CONT W 90	A.C.PROP. 60	TTC W 60	ELEC W 150	MISS EQ W 150	TOTAL D W 693	TO W IN EX 753	ADAPTER W 0	LAUNCH W 753
TYPE ST ENDO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3 AXIS	TYPE EP SOLAR	TYPE KICK TUG	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

SMALL APPLIC. TECHNOLOGY NCN-28 06/11/71

MISS. OBJ. TO DESIGN,DEVELOP,LAUNCH,AND OPERATE A SERIES OF SMALL R AND D SATELLITES FOR THE EXPERIMENTAL APPLICATION OF RESEARCH AND TECHNOLOGY DEVELOPMENTS IN SPACECRAFT AND SENSOR SUBSYSTEMS.

PAYLOAD CURR.REUSE	PROGRAM N COM/NAV	AGENCY NASA	NO SATS 1	CHAR VELOC 3.9700E+04	CIRC ALTIT 1.9323E+04	NOM INCLIN 0.	NOM APOG 1.9323E+04	NOM PERIG 1.9323E+04
NOM ECCENT 0.	MAX APOG 1.9323E+04	MIN APOG 1.9323E+04	MAX PERIG 1.9323E+04	MIN PERIG 1.9323E+04	MAX INCLIN 0.	MIN INCLIN 0.	LCH WINDOW *NO ENTRY*	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1979	FLTS 1979 1	FLTS 1980 1	FLTS 1981 1	FLTS 1982 1	FLTS 1983 1	FLTS 1984 1	FLTS 1985 1
FLTS 1986 1	FLTS 1987 1	FLTS 1988 1	FLTS 1989 1	FLTS 1990 1	TOTAL FLTS 12	SYS LF 1	MEAN MISS 1.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS *NO ENTRY*	MIN PLD VS *NO ENTRY*	LCH VOLUME 500	LCH LENGTH 13.00	LCH DIAM 7.000	SENSOR 1 TV CAMERA	SENSOR 2 IR	SENSOR 3 LASER
SENSOR 4 CHG COLL.	SENSOR 5 NANO-G	POINT ACC 10 SEC	AV PWR 500.0	ST M V A W 238	ENV CONT W 10	GD NA ST W 55	PROPULS W *NO ENTRY*	P PROPEL W *NO ENTRY*
ATT CONT W 90	A.C.PROP. 60	TTC W 60	ELEC W 150	MISS EQ W 150	TOTAL D W 693	TO W IN EX 753	ADAPTER W 0	LAUNCH W 753
TYPE ST ENDO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3 AXIS	TYPE EP SOLAR	TYPE KICK TUG	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

COOPERATIVE APPLICATIONS NCN-3A 06/11/71

MISS. OBJ. COMMUNICATION SATELLITES TO BE FLOWN IN PARTNERSHIP WITH OTHER NATIONS WHO WILL PROVIDE CORRESPONDING TECHNICAL AND FUNDING ASSISTANC

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
CURR.REUSE	N COM/NAV	NASA	1	3.9700E+04	1.9323E+04	0.	1.9323E+04	1.9323E+04
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
0.	1.9323E+04	1.9323E+04	1.9323E+04	1.9323E+04	1.9323E+04	1.9323E+04	*NO ENTRY*	SHUTTLE
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
ETR	1979	1	0	0	0	0	1	0
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
0	0	0	0	0	2	2	2.000	...NONE...
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
...NONE...	*NO ENTRY*	*NO ENTRY*	500	13.00	7.000	HF	VHF	SLO.ST.DET
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
NO ENTRY	*NO ENTRY*	10 SEC	420.0	277	20	80	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
100	70	80	200	250	938	1007	0	1007
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
ENDO	LIQUID	HYDRAZINE	3-AXIS	SOLAR	TUG	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC P C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

MISS. OBJ. COMMUNICATION SATELLITES TO BE FLOWN IN PARTNERSHIP WITH OTHER NATIONS WHO WILL PROVIDE CORRESPONDING TECHNICAL AND FUNDING ASSISTANCE.

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
CURR.REUSE	N COM/NAV	NASA	1	2.9400E+04	...NONE...	90.00	3000	300.0
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
.2660	3000	3000	300.0	300.0	90.00	90.00	*NO ENTRY*	SHUTTLE
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
ETR	1982	0	0	0	1	0	0	0
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
0	0	0	1	0	2	2	2.000	...NONE...
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
...NONE...	*NO ENTRY*	*NO ENTRY*	500	13.00	7.000	HF	VHF	SLD.ST.DET
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
NO ENTRY	*NO ENTRY*	10 SEC	420.0	277	20	80	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
100	70	80	200	250	938	1007	0	1007
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
ENDO	LIQUID	HYDRAZINE	3-AXIS	SOLAR	TUG	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

TRACKING AND DATA RELAY   NCN-5   06/11/71

MISS. OBJ.   DEVELOP AND OPERATE A COMMAND, TRACKING AND DATA RELAY OF LOW ORBITING SATELLITE FROM SYNCHRONOUS SATELLITE TO A FEW CENTRALLY LOCATED MISSION CONTROL CENTERS.

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
CURR.REUSE	OPERAT.SCI	NASA	3	3.9700E+04	1.9323E+04	0.	1.9323E+04	1.9323E+04
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
0.	1.9323E+04	1.9323E+04	1.9323E+04	1.9323E+04	1.000	-1.000	*NO ENTRY*	SHUTTLE
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
ETR	1979	1	2	1	0	2	1	0
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
0	2	1	0	0	10	2	3.000	MNT/R
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
MNT	150.0	10.00	1559	18.00	10.50	COMMUN	COMMAND	TRACKING
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
VHF	LASER	0.1 DEG	680.0	867	60	140	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
400	320	0	650	600	2397	2717	0	2717
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
ENDO	LIQUID	HYDRAZINE	SPIN	SOLAR	TUG	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

MISS. OBJ. PROVIDE OPERATIONAL SERVICES IN INFORMATION NETWORKS
NAVIGATION

PAYLOAD CURR.REUSE	PROGRAM OPERAT.SC	AGENCY NON NASA	NO SATS 3	CHAR VELOC 3.9700E+04	CIRC ALTIT 1.9323E+04	NOM INCLIN 0.	NOM APOG 1.9323E+04	NOM PERIG 1.9323E+04
NOM ECCENT 0.	MAX APOG 1.9323E+04	MIN APOG 1.9323E+04	MAX PERIG 1.000	MIN PERIG -1.000	MAX INCLIN 0.	MIN INCLIN 0.	LCH WINDOW *NO ENTRY*	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1979	FLTS 1979 2	FLTS 1980 1	FLTS 1981 1	FLTS 1982 0	FLTS 1983 2	FLTS 1984 1	FLTS 1985 1
FLTS 1986 0	FLTS 1987 0	FLTS 1988 2	FLTS 1989 1	FLTS 1990 0	TOTAL FLTS 11	SYS LF 12	MEAN MISS 5.000	TYPE MNT R MNT/R
EXP MNT PH MNT	MAX PLD VS 50.00	MIN PLD VS 10.00	LCH VOLUME 1630	LCH LENGTH 23.00	LCH DIAM 9.500	SENSOR 1 MULT.ANT.	SENSOR 2 TRNSPONDER	SENSOR 3 UHF
SENSOR 4 LASER	SENSOR 5 VHF	POINT ACC 0.2 DEG	AV PWR 585.0	ST M V A W 489	ENV CONT W 65	GD NA ST W 101	PROPULS W 0	P PROPEL W 0
ATT CONT W 335	A.C.PROP. 274	TTC W 51	ELEC W 307	MISS EQ W 355	TOTAL D W 1429	TO W IN EX 1703	ADAPTER W 0	LAUNCH W 1703
TYPE ST ENDO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C SPIN	TYPE EP SOLAR	TYPE KICK TUG	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

U.S. DOMESTIC COMMUNIC. NCN-8 06/11/71

MISS. OBJ. PROVIDE OPERATIONAL SERVICES IN COMMUNICATION NETWORKS
CABLE TV, BROADCAST TV, RADIO, TELEPHONE, TELETYPE, ETC.

PAYLOAD CURR.REUSE	PROGRAM OPERAT.SCI	AGENCY NON NASA	NO SATS 3	CHAR VELOC 3.9700E+04	CIRC ALTIT 1.9323E+04	NOM INCLIN 0.	NOM APOG 1.9323E+04	NOM PERIG 1.9300E+04
NOM ECCENT 1.9323E+04	MAX APOG 1.9323E+04	MIN APOG 1.9323E+04	MAX PERIG 1.9323E+04	MIN PERIG 1.9323E+04	MAX INCLIN 1.000	MIN INCLIN -1.000	LCH WINDOW *NO ENTRY*	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1979	FLTS 1979 1	FLTS 1980 2	FLTS 1981 1	FLTS 1982 1	FLTS 1983 2	FLTS 1984 2	FLTS 1985 2
FLTS 1986 2	FLTS 1987 2	FLTS 1988 2	FLTS 1989 2	FLTS 1990 2	TOTAL FLTS 21	SYS LF 12	MEAN MISS 7.000	TYPE MNT R MNT/R
EXP MNT PH MNT	MAX PLD VS 200.0	MIN PLD VS 10.00	LCH VOLUME 4595	LCH LENGTH 26.00	LCH DIAM 15.00	SENSOR 1 MULT.ANT.	SENSOR 2 TRNSPONDER	SENSOR 3 UHF
SENSOR 4 VHF	SENSOR 5 LASER	POINT ACC 0.2 DEG	AV PWR 900.0	ST M V A W 1262	ENV CONT W 125	GD NA ST W 180	PROPULS W 0	P PROPEL W 0
ATT CONT W 500	A.C.PROP. 400	TTC W 100	ELEC W 850	MISS EQ W 1000	TOTAL D W 3617	TO W IN EX 4017	ADAPTER W 0	LAUNCH W 4017
TYPE ST ENDO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C SPIN	TYPE EP SOLAR	TYPE KICK TUG	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. PROVIDE OPERATIONAL SERVICES IN COMMUNICATION NETWORKS FOR SOUTH AMERICA,CANADA, AUSTRALIA, ESRO, SOUTH AFRICA, INDIA AND NEIGBORING COUNTRIES.

PAYLOAD CURR.REUSE	PROGRAM OPERAT.SC.	AGENCY NON NASA	NO SATS 2	CHAR VELOC 3.9700E+04	CIRC ALTIT 1.9323E+04	NOM INCLIN 0.	NOM APOG 1.9323E+04	NOM PERIG 1.9323E+04
NOM ECCENT 0.	MAX APOG 1.9323E+04	MIN APOG 1.9323E+04	MAX PERIG 1.9323E+04	MIN PERIG 1.9323E+04	MAX INCLIN 29.00	MIN INCLIN -1.000	LCH WINDOW *NO ENTRY*	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1980	FLTS 1979 0	FLTS 1980 2	FLTS 1981 6	FLTS 1982 2	FLTS 1983 2	FLTS 1984 0	FLTS 1985 0
FLTS 1986 4	FLTS 1987 5	FLTS 1988 2	FLTS 1989 1	FLTS 1990 2	TOTAL FLTS 26	SYS LF 11	MEAN MISS 5.000	TYPE MNT R MNT/R
EXP MNT PH MAINT	MAX PLD VS 25.00	MIN PLD VS 5.000	LCH VOLUME 368	LCH LENGTH 13.00	LCH DIAM 6.000	SENSOR 1 ANTENNA	SENSOR 2 TRNSMITTER	SENSOR 3 UHF
SENSOR 4 VHF	SENSOR 5 HF	POINT ACC .2 DEG	AV PWR 230.0	ST M V A W 384	ENV CONT W 25	GD NA ST W 95	PROPULS W 0	P PROPEL W 0
ATT CONT W 120	A.C.PROP. 80	TTC W 95	ELEC W 210	MISS EQ W 285	TOTAL D W 1134	TO W IN EX 1214	ADAPTER W 0	LAUNCH W 1214
TYPE ST ENDO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C SPIN	TYPE EP SOLAR	TYPE KICK TUG	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO FNTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. DATA COLLECTION SATELLITE TO GATHER DATA FROM REMOTE MOBILE PLATFORM AND SCATTERED TRANSMITTERS AND CENTRALIZE THE OUTPUTS INTO A COMMON DATA CENTER.

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
CURR.REUSE	OPERAT.SC	NON NASA	1	3.9450E+04	1.9300E+04	5.000	1.9300E+04	1.9300E+04
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
0.	1.9300E+04	1.9300E+04	1.9300E+04	5.000	5.000	*NO ENTRY*	*NO ENTRY*	SHUTTLE
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
ETR	1979	1	0	1	0	1	0	1
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
0	1	0	1	0	6	12	5.000	...NONE...
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
...NONE...	0.	0.	254	9.000	6.000	HF	VHF	UHF
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
COMMAND	TIMER	0.5 DEG	200.0	279	20	70	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
100	65	75	190	135	804	869	0	869
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
ENDO	LIQUID	GN2	3 AXIS	SOLAR	TUG	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

NAV/TRAFFIC CONTROL NCN-10B 06/11/71

MISS. OBJ. NAVIGATION DATA OVER OCEANS AND DOMESTIC AREAS.

PAYLOAD CURR.REUSE	PROGRAM OPERAT.SC.	AGENCY NON NASA	NO SATS 4	CHAR VELOC 3.9500E+04	CIRC ALTIT *NO ENTRY*	NOM INCLIN 29.00	NOM APOG 3.0000E+04	NOM PERIG 1.6000E+04
NOM ECCENT .2640	MAX APOG 3.0000E+04	MIN APOG 3.0000E+04	MAX PERIG 1.6000E+04	MIN PERIG 1.6000E+04	MAX INCLIN 29.00	MIN INCLIN 29.00	LCH WINDOW *NO ENTRY*	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1979	FLTS 1979 3	FLTS 1980 1	FLTS 1981 2	FLTS 1982 0	FLTS 1983 1	FLTS 1984 0	FLTS 1985 1
FLTS 1986 0	FLTS 1987 1	FLTS 1988 0	FLTS 1989 1	FLTS 1990 0	TOTAL FLTS 10	SYS LF 12	MEAN MISS 5.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 254	LCH LENGTH 9.000	LCH DIAM 6.000	SENSOR 1 HF	SENSOR 2 VHF	SENSOR 3 UHF
SENSOR 4 COMMAND	SENSOR 5 DETECTORS	POINT ACC 0.5	AV PWR 200.0	ST M V A W 279	ENV CONT W 20	GD NA ST W 70	PROPULS W 0	P PROPEL W 0
ATT CONT W 100	A.C.PROP. 65	TTC W 75	ELEC W 190	MISS EQ W 135	TOTAL D W 804	TO W IN EX 869	ADAPTER W 0	LAUNCH W 869
TYPE ST ENDO	TYPE PROP LIQUID	TYPE PROPE GN2	TYPE A C 3 AXIS	TYPE EP SOLAR	TYPE KICK TUG	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. SYSTEM DEMONSTRATION SATELLITES FOR LAW ENFORCEMENT, AIR TRAFFIC CONTROL, LAND TRAFFIC CONTROL TYPE MISSIONS.

PAYLOAD CURR.REUSE	PROGRAM N COM/NAV	AGENCY NASA	NO SATS 2	CHAR VELOC 3.9700E+04	CIRC ALTIT 1.9323E+04	NOM INCLIN 0.	NOM APOG 1.9323E+04	NOM PERIG 1.9323E+04
NOM ECCENT 0.	MAX APOG 1.9323E+04	MIN APOG 1.9323E+04	MAX PERIG 1.9323E+04	MIN PERIG 1.9323E+04	MAX INCLIN 0.	MIN INCLIN 0.	LCH WINDOW *NO ENTRY*	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1981	FLTS 1979 0	FLTS 1980 0	FLTS 1981 2	FLTS 1982 2	FLTS 1983 2	FLTS 1984 2	FLTS 1985 2
FLTS 1986 2	FLTS 1987 2	FLTS 1988 2	FLTS 1989 2	FLTS 1990 2	TOTAL FLTS 20	SYS LF 5	MEAN MISS 5.000	TYPE MNT R MNT/R
EXP MNT PH REFURB.	MAX PLD VS *NO ENTRY*	MIN PLD VS *NO ENTRY*	LCH VOLUME 1963	LCH LENGTH 16.00	LCH DIAM 12.50	SENSOR 1 COMM.	SENSOR 2 NAVIG.	SENSOR 3 DATA REL
SENSOR 4 EARTH RES.	SENSOR 5 *NO ENTRY*	POINT ACC .2 DEG	AV PWR 1000	ST M V A W 740	ENV CONT W 50	GD NA ST W 205	PROPULS W 0	P PROPEL W 0
ATT CONT W 380	A.C.PROP. 300	TTC W 170	ELEC W 510	MISS EQ W 315	TOTAL D W 2070	TO W IN EX 2370	ADAPTER W 0	LAUNCH W 2370
TYPE ST ENDO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3 AXIS	TYPE EP SOLAR	TYPE KICK TUG	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

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Table A4-3. NASA and Non-NASA Low Cost Expendable Payload Data

Index of Defined Satellites

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ORBITING SOLAR OBSERVATORY NAS-15 06/11/71

MISS. OBJ. MONITOR TEMPORAL VARIATIONS OF THE SUNS BRIGHTNESS IN THE UV,X-RAY AND GAMMA-RAY REGIONS.

PAYLOAD LO.CT.EXP.	PROGRAM N ASTRNOMY	AGENCY NASA	NO SATS 1	CHAR VELOC 2.6480E+04	CIRC ALTIT 350.0	NOM INCLIN 28.50	NOM APOG 350.0	NOM PERIG 350.0
NOM ECCENT 0.	MAX APOG 400.0	MIN APOG 300.0	MAX PERIG 400.0	MIN PERIG 300.0	MAX INCLIN 58.50	MIN INCLIN 0.	LCH WINDOW ...NONE...	LCH VEH 1 *NO ENTRY*
LCH SITE 1 ETR	IN LCH DAT 1980	FLTS 1979 0	FLTS 1980 1	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 1	SYS LF 1	MEAN MISS 1.000	TYPE MNT R MAINT
EXP MNT PH REPLACE	MAX PLD VS 30.00	MIN PLD VS 10.00	LCH VOLUME 1217	LCH LENGTH 15.50	LCH DIAM 10.00	SENSOR 1 SPCTRMTRS	SENSOR 2 PHTOMTRS	SENSOR 3 X-RAY SENS
SENSOR 4 UV SENS	SENSOR 5 VIDICON	POINT ACC 5 SEC	AV PWR 300.0	ST M V A W 1310	ENV CONT W 210	GD NA ST W 256	PROPULS W 0	P PROPEL W 0
ATT CONT W 647	A.C.PROP. 315	TTC W 205	ELEC W 497	MISS EQ W 970	TOTAL D W 3780	TO W IN EX 4095	ADAPTER W 175	LAUNCH W 4270
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK *NO ENTRY*	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. TO MEASURE IONOSPHERIC CURRENT SYSTEMS AND BEHAVIOR WITH RESPECT TO SOLAR ACTIVITY, ALSO NEUTRAL ATMOSPHERE STUDIES.

PAYLOAD LO.CT.EXP.	PROGRAM N SPA PHYS	AGENCY NASA	NO SATS 1	CHAR VELOC 3.6301E+04	CIRC ALTIT ...NONE...	NOM INCLIN 28.50	NOM APOG 2.0000E+04	NOM PERIG 1000
NOM ECCENT .6800	MAX APOG 2.0000E+04	MIN APOG 2.0000E+04	MAX PERIG 1000	MIN PERIG 1000	MAX INCLIN 90.00	MIN INCLIN 0.	LCH WINDOW ...NONE...	LCH VEH 1 *NO ENTRY*
LCH SITE 1 ETR	IN LCH DAT 1979	FLTS 1979 1	FLTS 1980 1	FLTS 1981 1	FLTS 1982 1	FLTS 1983 1	FLTS 1984 1	FLTS 1985 1
FLTS 1986 1	FLTS 1987 1	FLTS 1988 1	FLTS 1989 1	FLTS 1990 1	TOTAL FLTS 12	SYS LF 3	MEAN MISS 1.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 541	LCH LENGTH 8.500	LCH DIAM 9.000	SENSOR 1 SLD-ST DET	SENSOR 2 ION-CR MON	SENSOR 3 ELE-CR MON
SENSOR 4 PHTOMULTIP	SENSOR 5 SCINT.CNT	POINT ACC 2 DEG	AV PWR 100.0	ST M V A W 780	ENV CONT W 75	GD NA ST W 80	PROPULS W 0	P PROPEL W 0
ATT CONT W 1005	A.C.PROP. 720	TTC W 128	ELEC W 128	MISS EQ W 115	TOTAL D W 1591	TO W IN EX 2311	ADAPTER W 89	LAUNCH W 2400
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C SPIN	TYPE EP SOLAR	TYPE KICK *NO ENTRY*	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. TO MONITOR SPACE WEATHER AND THE BOUNDARY OF THE GEOMAGNETIC FIELD AS IT INTERACTS WITH THE SOLAR WIND.

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
LO.CT.EXP.	N SPA PHYS	NASA	1	4.0000E+04	8.0800E+07	23.45	8.0800E+07	8.0800E+07
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
0.	8.0800E+07	8.0800E+07	8.0800E+07	8.0800E+07	23.45	23.45	...NONE...	*NO ENTRY*
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
ETR	1979	1	1	1	1	1	1	1
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
1	1	1	1	1	12	3	1.000	...NONE...
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
...NONE...	0.	0.	212	7.500	6.000	MAG.FD.SEN	ENRGY.SPEC	SOLR.WD.DE
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
NO ENTRY	*NO ENTRY*	*NO ENTRY*	300.0	406	60	35	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
251	108	90	142	173	1049	1157	43	1200
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
EXO	LIQUID	HYDRAZINE	SPIN	SOLAR	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

SYNCHRONOUS EARTH OBSERVATION NEO-3

06/11/71

MISS. OBJ. RESEARCH SATELLITE TO INVESTIGATE AND DEVELOP REMOTE SENSING TECHNIQUES FOR MEASUREMENT OF THE EARTHS SURFACE AND ATMOSPHERE FROM SYNC ALTITUDE.

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
LO.CT.EXP.	N EAR OBS	NASA	1	3.9700E+04	1.9323E+04	0.	1.9323E+04	1.9323E+04
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
0.	1.9323E+04	1.9323E+04	1.9323E+04	1.9323E+04	0.	0.	...NONE...	*NO ENTRY*
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
ETR	1980	0	1	0	1	0	1	0
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
1	0	1	0	1	6	2	2.000	...NONE...
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
...NONE...	0.	0.	604	9.500	9.000	EAR.SENS.	METEOR.SEN	IR SCAN
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
SPECTROM	MICROWAVE	10 SEC	400.0	853	160	83	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
465	200	121	362	515	2359	2559	111	2670
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
EXO	LIQUID	HYDRAZINE	3-AXIS	SOLAR	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

SYNCHRONOUS EARTH RESOURCES SA NEO-4 06/11/71

MISS. OBJ. TO DESIGN, DEVELOP AND OPERATE A SATELLITE SYSTEM FOR REMOTE SENSING OF THE EARTHS SURFACE AND THE LOWER REGIONS OF THE ATMOSPHERE FROM SYNCHRONOUS ORBITAL ALTITUDES.

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
LO.CT.EXP.	N EAR OBS	NASA	4	3.9700E+04	1.9323E+04	0.	1.9323E+04	1.9323E+04
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
0.	1.9323E+04	1.9323E+04	1.9323E+04	1.9323E+04	0.	0.	...NONE...	*NO ENTRY*
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
ETR	1981	0	0	1	2	1	0	0
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
0	1	2	0	0	7	2	2.000	...NONE...
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
...NONE...	0.	0.	604	9.500	9.000	IR SCANNER	RADIOMETER	MICROWAVE
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
IMAG.SPEC.	SPECTROM	10 SEC	400.0	879	180	83	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
496	288	121	362	515	2348	2636	104	2740
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
EXO	LIQUID	HYDRAZINE	3-AXIS	SOLAR	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

MISS. OBJ. TO MAKE PRECISION MEASUREMENTS OF THE EARTHS LAND AND SEA AREAS TO DETERMINE -1- CONTINENTAL DRIFT, -2- MASS DISTRIBUTION, -3- SURFACE STRAIN, AND -4- VARIATION OF GRAVITY, SEA ALTITUDE, AND MASS.

PAYLOAD LO.CT.EXP.	PROGRAM N EAR OBS	AGENCY NASA	NO SATS 1	CHAR VELOC 2.6600E+04	CIRC ALTIT 700.0	NOM INCLIN 90.00	NOM APOG 700.0	NOM PERIG 700.0
NOM ECCENT 0.	MAX APOG 1000	MIN APOG 400.0	MAX PERIG 1000	MIN PERIG 400.0	MAX INCLIN 103.0	MIN INCLIN 80.00	LCH WINDOW ...NONE...	LCH VEH 1 *NO ENTRY*
LCH SITE 1 WTR	IN LCH DAT 1980	FLTS 1979 0	FLTS 1980 1	FLTS 1981 1	FLTS 1982 1	FLTS 1983 1	FLTS 1984 0	FLTS 1985 1
FLTS 1986 0	FLTS 1987 1	FLTS 1988 0	FLTS 1989 1	FLTS 1990 0	TOTAL FLTS 7	SYS LF 2	MEAN MISS 2.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 308	LCH LENGTH 8.000	LCH DIAM 7.000	SENSOR 1 MICROWAVE	SENSOR 2 LASERS	SENSOR 3 IMAG.DISS
SENSOR 4 *NO ENTRY*	SENSOR 5 *NO ENTRY*	POINT ACC 1 SEC	AV PWR 200.0	ST M V A W 542	ENV CONT W 50	GD NA ST W 38	PROPULS W 0	P PROPEL W 0
ATT CONT W 335	A.C.PROP. 135	TTC W 77	ELEC W 308	MISS EQ W 225	TOTAL D W 1440	TO W IN EX 1575	ADAPTER W 55	LAUNCH W 1630
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK *NO ENTRY*	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

SYNCHRONOUS METEOROLOGICAL SAT NEO-8 06/11/71

MISS. OBJ. DEVELOP AND OPERATE A SYNCHRONOUS METEOROLOGICAL SATELLITE FOR DOC/ESSA.

PAYLOAD LO.CT.EXP.	PROGRAM N EAR OBS	AGENCY NASA	NO SATS 1	CHAR VELOC 3.9700E+04	CIRC ALTIT 1.9323E+04	NOM INCLIN 0.	NOM APOG 1.9323E+04	NOM PERIG 1.9323E+04
NOM ECCENT 0.	MAX APOG 1.9323E+04	MIN APOG 1.9323E+04	MAX PERIG 1.9323E+04	MIN PERIG 1.9323E+04	MAX INCLIN 0.	MIN INCLIN 0.	LCH WINDOW ...NONE...	LCH VEH 1 *NO ENTRY*
LCH SITE 1 ETR	IN LCH DAT 1982	FLTS 1979 0	FLTS 1980 0	FLTS 1981 0	FLTS 1982 1	FLTS 1983 1	FLTS 1984 0	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 2	SYS LF 2	MEAN MISS 2.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 604	LCH LENGTH 9.500	LCH DIAM 9.000	SENSOR 1 VIS.SCANNR	SENSOR 2 IR SCANNR	SENSOR 3 ENVIR.MON.
SENSOR 4 DATA COLL	SENSOR 5 RELAY CAP.	POINT ACC 10 SEC	AV PWR 300.0	ST M V A W 861	ENV CONT W 120	GD NA ST W 90	PROPULS W 0	P PROPEL W 0
ATT CONT W 565	A.C.PROP. 234	TTC W 128	ELEC W 451	MISS EQ W 368	TOTAL D W 2349	TO W IN EX 2583	ADAPTER W 87	LAUNCH W 2670
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK *NO ENTRY*	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

C.6.

SYNCHRONOUS METEOROLOGICAL NEO-15 06/11/71

MISS. OBJ. OPERATIONAL METEOROLOGICAL SATELLITE OPERATING FROM SYNCHRONOUS ALTITUDE FOR ESSA.

PAYLOAD LO.CT.EXP.	PROGRAM OPERAT.SC.	AGENCY NON NASA	NO SATS 2	CHAR VELOC 3.9700E+04	CIRC ALTIT 1.9323E+04	NOM INCLIN 0.	NOM APOG 1.9323E+04	NOM PERIG 1.9323E+04
NOM ECCENT 0.	MAX APOG 1.9323E+04	MIN APOG 1.9323E+04	MAX PERIG 1.9323E+04	MIN PERIG 1.9323E+04	MAX INCLIN 0.	MIN INCLIN 0.	LCH WINDOW *NO ENTRY*	LCH VEH 1 *NO ENTRY*
LCH SITE 1 ETR	IN LCH DAT 1979	FLTS 1979 1	FLTS 1980 1	FLTS 1981 1	FLTS 1982 1	FLTS 1983 1	FLTS 1984 1	FLTS 1985 1
FLTS 1986 1	FLTS 1987 1	FLTS 1988 1	FLTS 1989 1	FLTS 1990 1	TOTAL FLTS 12	SYS LF 12	MEAN MISS 2.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 604	LCH LENGTH 9.500	LCH DIAM 9.000	SENSOR 1 VIS.SCANNR	SENSOR 2 IR SCANNER	SENSOR 3 ENVIR.MON
SENSOR 4 DATA COLL	SENSOR 5 RELAY CAP.	POINT ACC 10 SEC	AV PWR 300.0	ST M V A W 866	ENV CONT W 120	GD NA ST W 90	PROPULS W 0	P PROPEL W 0
ATT CONT W 574	A.C.PROP. 243	TTC W 128	ELEC W 451	MISS EQ W 368	TOTAL D W 2354	TO W IN EX 2597	ADAPTER W 83	LAUNCH W 2680
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK *NO ENTRY*	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. OPERATIONAL SATELLITE TO CONTINUALLY SURVEY EARTH RESOURCES AND TO PERFORM METEOROLOGICAL SURVEY WITH HIGH RESOLUTION SENSOR AND TRANSMITTING DATA TO EARTH.

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
LO.CT.EXP.	OPERAT.SC.	NON NASA	4	2.6950E+04	500.0	103.0	500.0	500.0
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
0.	550.0	450.0	550.0	450.0	103.0	103.0	*NO ENTRY*	*NO ENTRY*
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
WTR	1979	4	0	4	0	4	0	4
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
0	0	0	6	0	22	12	2.000	...NONE...
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
...NONE...	0.	0.	2309	15.00	14.00	IMAG.RADIO	IR RADIO	MICROWAVE
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
RAD.SCANNR	IR SCANNER	.04 DEG	600.0	1765	360	256	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
882	352	230	1085	1250	5476	5828	222	6050
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
EXO	LIQUID	HYDRAZINE	3-AXIS	SOLAR	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

POLAR ERS NEO-17 06/11/71

MISS. OBJ. TO DESIGN, DEVELOP AND OPERATE A SPACE OBSERVATORY SYSTEM TO PERFORM METEOROLOGICAL AND EARTH RESOURCES SURVEYING BY ADVANCED REMOTE SENSING TECHNIQUES.

PAYLOAD LO.CT.EXP.	PROGRAM N EAR OBS	AGENCY NASA	NO SATS 4	CHAR VELOC 2.6950E+04	CIRC ALTIT 500.0	NOM INCLIN 103.0	NOM APOG 500.0	NOM PERIG 500.0
NOM ECCENT 0.	MAX APOG 550.0	MIN APOG 450.0	MAX PERIG 550.0	MIN PERIG 450.0	MAX INCLIN 103.0	MIN INCLIN 103.0	LCH WINDOW ...NONE...	LCH VEH 1 *NO ENTRY*
LCH SITE 1 WTR	IN LCH DAT 1986	FLTS 1979 0	FLTS 1980 0	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 0
FLTS 1986 2	FLTS 1987 4	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 6	SYS LF 2	MEAN MISS 2.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 2001	LCH LENGTH 13.00	LCH DIAM 14.00	SENSOR 1 MICROWAVE	SENSOR 2 IR RADIO.	SENSOR 3 IR SCANNER
SENSOR 4 VIS.SCANNR	SENSOR 5 RADAR	POINT ACC .04 DEG	AV PWR 600.0	ST M V A W 1670	ENV CONT W 90	GD NA ST W 256	PROPULS W 0	P PROPEL W 0
ATT CONT W 882	A.C.PROP. 352	TTC W 230	ELEC W 1085	MISS EQ W 1250	TOTAL D W 5111	TO W IN EX 5463	ADAPTER W 217	LAUNCH W 5680
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK *NO ENTRY*	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. TO DESIGN, DEVELOP, LAUNCH, AND OPERATE A SERIES OF SMALL R AND D SATELLITES FOR THE EXPERIMENTAL APPLICATION OF RESEARCH AND TECHNOLOGY DEVELOPMENTS IN SPACECRAFT AND SENSOR SUBSYSTEMS.

PAYLOAD LO.CT.EXP.	PROGRAM N COM NAV	AGENCY NASA	NO SATS 1	CHAR VELOC 2.9400E+04	CIRC ALTIT ...NONE...	NOM INCLIN 90.00	NOM APOG 3000	NOM PERIG 300.0
NOM ECCENT 0.	MAX APOG 3000	MIN APOG 3000	MAX PERIG 3100	MIN PERIG 280.0	MAX INCLIN 90.00	MIN INCLIN 0.	LCH WINDOW *NO ENTRY*	LCH VEH 1 *NO ENTRY*
LCH SITE 1 WTR	IN LCH DAT 1979	FLTS 1979 1	FLTS 1980 1	FLTS 1981 1	FLTS 1982 1	FLTS 1983 1	FLTS 1984 1	FLTS 1985 1
FLTS 1986 1	FLTS 1987 1	FLTS 1988 1	FLTS 1989 1	FLTS 1990 1	TOTAL FLTS 12	SYS LF 1	MEAN MISS 1.000	TYPE MNT R *NO ENTRY*
EXP MNT PH ...NONE...	MAX PLD VS *NO ENTRY*	MIN PLD VS *NO ENTRY*	LCH VOLUME 398	LCH LENGTH 12.00	LCH DIAM 6.500	SENSOR 1 TV CAMERA	SENSOR 2 IR	SENSOR 3 LASER
SENSOR 4 CHG.COLL	SENSOR 5 NANO-G	POINT ACC 10 SEC	AV PWR 500.0	ST M V A W 409	ENV CONT W 10	GD NA ST W 32	PROPULS W 0	P PROPEL W 0
ATT CONT W 251	A.C.PROP. 108	TTC W 77	ELEC W 213	MISS EQ W 173	TOTAL D W 1057	TO W IN EX 1165	ADAPTER W 39	LAUNCH W 1204
TYPE ST ENDO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK *NO ENTRY*	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

SMALL APPLIC. TECHNOLOGY NCN-2B

06/11/71

MISS. OBJ. TO DESIGN,DEVELOP,LAUNCH,AND OPERATE A SERIES OF SMALL R AND D SATELLITES FOR THE EXPERIMENTAL APPLICATION OF RESEARCH AND TECHNOLOGY DEVELOPMENTS IN SPACECRAFT AND SENSOR SUBSYSTEMS.

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
LO.CT.EXP.	N COM/NAV	NASA	1	3.9700E+04	1.9323E+04	0.	1.9323E+04	1.9323E+04
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
0.	1.9323E+04	1.9323E+04	1.9323E+04	1.9323E+04	0.	0.	*NO ENTRY*	*NO ENTRY*
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
ETR	1979	1	1	1	1	1	1	1
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
1	1	1	1	1	12	1	1.000	...NONE...
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
...NONE...	*NO ENTRY*	*NO ENTRY*	398	12.00	6.500	TV CAMERA	IR	LASER
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
CHG COLL.	NANO-G	10 SEC	500.0	409	10	32	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
251	108	77	213	173	1057	1165	39	1204
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
ENDO	LIQUID	HYDRAZINE	3-AXIS	SOLAR	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

MISS. OBJ. COMMUNICATION SATELLITES TO BE FLOWN IN PARTNERSHIP WITH OTHER NATIONS WHO WILL PROVIDE CORRESPONDING TECHNICAL AND FUNDING ASSISTANC

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
LO.CT.EXP.	N COM/NAV	NASA	1	3.9700E+04	1.9323E+04	0.	1.9323E+04	1.9323E+04
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
0.	1.9323E+04	1.9323E+04	1.9323E+04	1.9323E+04	1.9323E+04	1.9323E+04	*NO ENTRY*	*NO ENTRY*
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
ETR	1979	1	0	0	1	0	1	0
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
0	0	0	1	0	4	2	2.000	...NONE...
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
...NONE...	*NO ENTRY*	*NO ENTRY*	1806	19.00	11.00	HF	VHF	SLD.ST.DET
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
NO ENTRY	*NO ENTRY*	10 SEC	420.0	905	100	64	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
892	230	102	362	288	2483	2713	107	2820
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
ENDO	LIQUID	HYDRAZINE	3-AXIS	SOLAR	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

MISS. OBJ. COMMUNICATION SATELLITES TO BE FLOWN IN PARTNERSHIP WITH OTHER NATIONS WHO WILL PROVIDE CORRESPONDING TECHNICAL AND FUNDING ASSISTANCE.

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
LO.CT.EXP.	N COM/NAV	NASA	1	2.9400E+04	300.0	28.50	300.0	300.0
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
0.	3000	300.0	300.0	300.0	90.00	0.	*NO ENTRY*	*NO ENTRY*
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
ETR	1982	0	0	0	1	0	0	0
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
0	0	0	1	0	2	2	2.000	...NONE...
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
...NONE...	*NO ENTRY*	*NO ENTRY*	398	12.00	6.500	HF	VHF	SLD.ST.DET
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
NO ENTRY	*NO ENTRY*	10 SEC	420.0	624	20	64	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
352	154	102	362	288	1658	1812	66	1878
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
ENDO	LIQUID	HYDRAZINE	3-AXIS	SOLAR	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

MISS. OBJ. MEASURE PLANET MAGNETOSPHERE, MAGNETOSHEATH, DETACHED BOW SHOCK WAVE, AND TAIL AND WAKE REGION. INVESTIGATE INTERNAL COMPOSITION, STRUCTURE AND MAGNETIC FIELD.

PAYLOAD LO.CT.EXP.	PROGRAM N PLANTARY	AGENCY NASA	NO SATS 1	CHAR VELOC 3.9000E+04	CIRC ALTIT PLANETARY	NOM INCLIN PLANETARY	NOM APOG 2.1600E+04	NOM PERIG 530.0
NOM ECCENT .7260	MAX APOG PLANETARY	MIN APOG PLANETARY	MAX PERIG PLANETARY	MIN PERIG PLANETARY	MAX INCLIN PLANETARY	MIN INCLIN PLANETARY	LCH WINDOW 20 DAYS	LCH VEH 1 *NO ENTRY*
LCH SITE 1 ETR	IN LCH DAT 1980	FLTS 1979 0	FLTS 1980 1	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 1	SYS LF 1	MEAN MISS 1.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 481	LCH LENGTH 12.50	LCH DIAM 7.000	SENSOR 1 PART.CTRS	SENSOR 2 MAGNETOMTR	SENSOR 3 ION+E.PRBS
SENSOR 4 GEIGER CTR	SENSOR 5 CHARGE COL	POINT ACC 1 DEG	AV PWR 300.0	ST M V A W 413	ENV CONT W 40	GD NA ST W 38	PROPULS W 1050	P PROPEL W 902
ATT CONT W 358	A.C.PROP. 168	TTC W 90	ELEC W 253	MISS EQ W 58	TOTAL D W 1230	TO W IN EX 2300	ADAPTER W 80	LAUNCH W 2380
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C SPIN	TYPE EP SOLAR	TYPE KICK *NO ENTRY*	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

VENUS RADAR MAPPING NPL-6 06/11/71

MISS. OBJ. DETAILED SURFACE MAPPING OF VENUS TO A RESOLUTION OF 50 METERS, USING RADAR IMAGING.

PAYLOAD LO.CT.EXP.	PROGRAM N PLANTARY	AGENCY NASA	NO SATS 1	CHAR VELOC 3.9000E+04	CIRC ALTIT PLANETARY	NOM INCLIN PLANETARY	NOM APOG PLANETARY	NOM PERIG PLANETARY
NOM ECCENT PLANETARY	MAX APOG PLANETARY	MIN APOG PLANETARY	MAX PERIG PLANETARY	MIN PERIG PLANETARY	MAX INCLIN PLANETARY	MIN INCLIN PLANETARY	LCH WINDOW 20 DAYS	LCH VEH 1 *NO ENTRY*
LCH SITE 1 ETR	IN LCH DAT 1982	FLTS 1979 0	FLTS 1980 0	FLTS 1981 0	FLTS 1982 1	FLTS 1983 0	FLTS 1984 0	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 1	SYS LF 2	MEAN MISS 2.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 10868	LCH LENGTH 61.50	LCH DIAM 15.00	SENSOR 1 SIDE RADAR	SENSOR 2 CHARGE COL	SENSOR 3 IR
SENSOR 4 OPTICS	SENSOR 5 VIDICON	POINT ACC 0.1 DEG	AV PWR 1000	ST M V A W 862	ENV CONT W 720	GD NA ST W 64	PROPULS W 16605	P PROPEL W 14600
ATT CONT W 190	A.C.PROP. 58	TTC W 230	ELEC W 520	MISS EQ W 370	TOTAL D W 4903	TO W IN EX 19561	ADAPTER W 739	LAUNCH W 20300
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK *NO ENTRY*	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

VENUS EXPLORER LANDER-1ST NPL-7

06/11/71

MISS. OBJ. ANALYSIS OF SURFACE PROPERTIES AND ENVIRONMENT ON VENUS. MEASUREMENT OF ATMOSPHERIC PROPERTIES DURING DESCENT. SURFACE MAPPING BY ORBITER.

PAYLOAD LO.CT.EXP.	PROGRAM N PLANTARY	AGENCY NASA	NO SATS 1	CHAR VELOC 3.9000E+04	CIRC ALTIT PLANETARY	NOM INCLIN PLANETARY	NOM APOG PLANETARY	NOM PERIG PLANETARY
NOM ECCENT PLANETARY	MAX APOG PLANETARY	MIN APOG PLANTARY	MAX PERIG PLANETARY	MIN PERIG PLANETARY	MAX INCLIN PLANETARY	MIN INCLIN PLANETARY	LCH WINDOW 20 DAYS	LCH VEH 1 *NO ENTRY*
LCH SITE 1 ETR	IN LCH DAT 1985	FLTS 1979 0	FLTS 1980 0	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 0	FLTS 1985 1
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 1	SYS LF 1	MEAN MISS 1.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 5266	LCH LENGTH 29.80	LCH DIAM 15.00	SENSOR 1 SOIL ASSAY	SENSOR 2 MASS SPECT	SENSOR 3 PRES.GAUGE
SENSOR 4 NANO ACCEL	SENSOR 5 TV CAMERA	POINT ACC 1 DEG	AV PWR 700.0	ST M V A W 565	ENV CONT W 88	GD NA ST W 109	PROPULS W 8130	P PROPEL W 7200
ATT CONT W 125	A.C.PROP. 30	TTC W 128	ELEC W 634	MISS EQ W 660	TOTAL D W 3209	TO W IN EX 10439	ADAPTER W 361	LAUNCH W 10800
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK *NO ENTRY*	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. MEASURE PARTICLES AND FIELD ENVIRONMENT TO 5 AU, PARTICLE DENSITY OF ASTEROID BELT, MAGNETIC AND RADIATION FIELDS OF JUPITER, AND TO PROVIDE JUPITER IMAGING.

PAYLOAD LO.CT.EXP.	PROGRAM N PLANTARY	AGENCY NASA	NO SATS 2	CHAR VELOC 4.8300E+04	CIRC ALTIT PLANETARY	NOM INCLIN PLANETARY	NOM APOG PLANETARY	NOM PERIG PLANETARY
NOM ECCENT PLANETARY	MAX APOG PLANETARY	MIN APOG PLANETARY	MAX PERIG PLANETARY	MIN PERIG PLANETARY	MAX INCLIN PLANETARY	MIN INCLIN PLANETARY	LCH WINDOW 20 DAYS	LCH VEH 1 *NO ENTRY*
LCH SITE 1 ETR	IN LCH DAT 1982	FLTS 1979 0	FLTS 1980 0	FLTS 1981 0	FLTS 1982 2	FLTS 1983 0	FLTS 1984 0	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 2	SYS LF 2	MEAN MISS 2.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 1178	LCH LENGTH 15.00	LCH DIAM 10.00	SENSOR 1 CHG PART	SENSOR 2 CHG COL	SENSOR 3 MAGNETOMET
SENSOR 4 EL FIELD	SENSOR 5 TV CAMERA	POINT ACC 1 DEG	AV PWR 300.0	ST M V A W 433	ENV CONT W 20	GD NA ST W 38	PROPULS W 956	P PROPEL W 817
ATT CONT W 433	A.C.PROP. 168	TTC W 90	ELEC W 236	MISS EQ W 58	TOTAL D W 1279	TO W IN EX 2264	ADAPTER W 76	LAUNCH W 2340
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP RTG	TYPE KICK *NO ENTRY*	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

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Table A4-4. NASA and Non-NASA Low Cost Reusable Payload Data

Index of Defined Satellites

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MISS. OBJ. TO CONDUCT INVESTIGATIONS OF THE ENVIRONMENT OF THE LOWER MAGNETOSPHERE, NEUTRAL AIR CHEMISTRY AND DENSITY AND IONOSPHERIC BEHAVIOR.

PAYLOAD LO.CT.PEUS	PROGRAM N SPA PHYS	AGENCY NASA	NO SATS 1	CHAR VELOC 2.8000E+04	CIRC ALTIT ...NONE...	NOM INCLIN 90.00	NOM APOG 1900	NOM PERIG 140.0
NOM ECCENT .2000	MAX APOG 2000	MIN APOG 1800	MAX PERIG 180.0	MIN PERIG 100.0	MAX INCLIN 110.0	MIN INCLIN 70.00	LCH WINDOW ...NONE...	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1979	FLTS 1979 1	FLTS 1980 1	FLTS 1981 1	FLTS 1982 1	FLTS 1983 1	FLTS 1984 1	FLTS 1985 1
FLTS 1986 1	FLTS 1987 1	FLTS 1988 1	FLTS 1989 1	FLTS 1990 1	TOTAL FLTS 12	SYS LF 3	MEAN MISS 1.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 1470	LCH LENGTH 13.00	LCH DIAM 12.00	SENSOR 1 UV DETECT	SENSOR 2 CURR.COLL	SENSOR 3 VLF RECVRS
SENSOR 4 MASS SPECT	SENSOR 5 MAGNETOMET	POINT ACC 2 DEG	AV PWR 100.0	ST M V A W 1770	ENV CONT W 360	GD NA ST W 102	PROPULS W 0	P PROPEL W 0
ATT CONT W 2133	A.C.PROP. 1800	TTC W 116	ELEC W 122	MISS EQ W 115	TOTAL D W 2918	TO W IN EX 4718	ADAPTER W 0	LAUNCH W 4718
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C SPIN	TYPE EP SOLAR	TYPE KICK TUG	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MIDDLE MAGNETOSPHERE NSP-2 06/11/71

MISS. OBJ. TO MEASURE IONOSPHERIC CURRENT SYSTEMS AND BEHAVIOR WITH RESPECT TO SOLAR ACTIVITY, ALSO NEUTRAL ATMOSPHERE STUDIES.

PAYLOAD LO.CT.REUS	PROGRAM N SPA PHYS	AGENCY NASA	NO SATS 1	CHAR VELOC 3.6301E+04	CIRC ALTIT ...NONE...	NOM INCLIN 28.50	NOM APOG 2.0000E+04	NOM PERIG 1000
NOM ECCENT .6800	MAX APOG 2.0000E+04	MIN APOG 2.0000E+04	MAX PERIG 1000	MIN PERIG 1000	MAX INCLIN 90.00	MIN INCLIN 0.	LCH WINDOW ...NONE...	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1979	FLTS 1979 1	FLTS 1980 1	FLTS 1981 1	FLTS 1982 1	FLTS 1983 1	FLTS 1984 1	FLTS 1985 1
FLTS 1986 1	FLTS 1987 1	FLTS 1988 1	FLTS 1989 1	FLTS 1990 1	TOTAL FLTS 12	SYS LF 3	MEAN MISS 1.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 604	LCH LENGTH 9.500	LCH DIAM 9.000	SENSOR 1 SLD-ST DET	SENSOR 2 ION-CR MON	SENSOR 3 ELE-CR MON
SENSOR 4 PHTOMULTIP	SENSOR 5 SCINT.CNT	POINT ACC 2 DEG	AV PWR 100.0	ST M V A W 1095	ENV CONT W 75	GD NA ST W 80	PROPULS W 0	P PROPEL W 0
ATT CONT W 1095	A.C.PROP. 810	TTC W 116	ELEC W 122	MISS EQ W 115	TOTAL D W 1888	TO W IN EX 2698	ADAPTER W 0	LAUNCH W 2698
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C SPIN	TYPE EP SOLAR	TYPE KICK TUG	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. TO EXPERIMENTALLY TEST EINSTEINS GENERAL RELATIVITY THEORY. GYROSCOPES IN AN EARTH-ORBITING SATELLITE WILL EXPERIENCE TWO RELATIVISTIC PRECESSION EFFECTS.

PAYLOAD LO.CT.REUS	PROGRAM N SPA PHYS	AGENCY NASA	NO SATS 1	CHAR VELOC 2.6300E+04	CIRC ALTIT 300.0	NOM INCLIN 90.00	NOM APOG 300.0	NOM PERIG 300.0
NOM ECCENT 0.	MAX APOG 350.0	MIN APOG 300.0	MAX PERIG 350.0	MIN PERIG 300.0	MAX INCLIN 95.00	MIN INCLIN 85.00	LCH WINDOW ...NONE...	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1984	FLTS 1979 0	FLTS 1980 0	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 1	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 1	TOTAL FLTS 2	SYS LF 1	MEAN MISS 1.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 942	LCH LENGTH 12.00	LCH DIAM 10.00	SENSOR 1 GYRO	SENSOR 2 CHG.PART.	SENSOR 3 IR
SENSOR 4 MAGNETOMET	SENSOR 5 *NO ENTRY*	POINT ACC 1 SEC	AV PWR 700.0	ST M V A W 1440	ENV CONT W 350	GD NA ST W 192	PROPULS W 0	P PROPEL W 0
ATT CONT W 295	A.C.PROP. 200	TTC W 139	ELEC W 652	MISS EQ W 675	TOTAL D W 3543	TO W IN EX 3743	ADAPTER W 0	LAUNCH W 3743
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE GN2	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK *NO ENTRY*	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

POLAR EARTH OBSERVATION SATELL NEO-2 06/11/71

MISS. OBJ. TO DESIGN, DEVELOP AND OPERATE A SPACE OBSERVATORY SYSTEM TO PERFORM METEOROLOGICAL AND EARTH RESOURCES SURVEYING BY ADVANCED REMOTE SENSING TECHNIQUES.

PAYLOAD LO.CT.REUS	PROGRAM N EAR OPS	AGENCY NASA	NO SATS 1	CHAR VELOC 2.6950E+04	CIRC ALTIT 500.0	NOM INCLIN 90.00	NOM APOG 500.0	NOM PERIG 500.0
NOM ECCENT 0.	MAX APOG 550.0	MIN APOG 450.0	MAX PERIG 550.0	MIN PERIG 450.0	MAX INCLIN 99.00	MIN INCLIN 90.00	LCH WINDOW ...NONE...	LCH VEH 1 SHUTTLE
LCH SITE 1 WTR	IN LCH DAT 1979	FLTS 1979 1	FLTS 1980 1	FLTS 1981 1	FLTS 1982 1	FLTS 1983 1	FLTS 1984 1	FLTS 1985 1
FLTS 1986 1	FLTS 1987 1	FLTS 1988 1	FLTS 1989 1	FLTS 1990 1	TOTAL FLTS 12	SYS LF 2	MEAN MISS 2.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 2190	LCH LENGTH 16.50	LCH DIAM 13.00	SENSOR 1 MICROWAVE	SENSOR 2 IR RADIO	SENSOR 3 RADAR SCAT
SENSOR 4 IR SCANNER	SENSOR 5 OPTICS	POINT ACC .07 DEG	AV PWR 600.0	ST M V A W 2160	ENV CONT W 90	GD NA ST W 256	PROPULS W 0	P PROPEL W 0
ATT CONT W 930	A.C.PROP. 400	TTC W 209	ELEC W 1085	MISS EQ W 1250	TOTAL D W 5580	TO W IN EX 5980	ADAPTER W 0	LAUNCH W 5980
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK *NO ENTRY*	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

SYNCHRONOUS EARTH OBSERVATION NEO-3 06/11/71

MISS. OBJ. RESEARCH SATELLITE TO INVESTIGATE AND DEVELOP REMOTE SENSING TECHNIQUES FOR MEASUREMENT OF THE EARTHS SURFACE AND ATMOSPHERE FROM SYNC ALTITUDE.

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
LO.CT.REUS	N EAR OBS	NASA	1	3.9700E+04	1.9323E+04	0.	1.9323E+04	1.9323E+04
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
0.	1.9323E+04	1.9323E+04	1.9323E+04	1.9323E+04	0.	0.	...NONE...	SHUTTLE
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
ETR	1980	0	1	0	1	0	1	0
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
1	0	1	0	1	6	2	2.000	...NONE...
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
...NONE...	0.	0.	668	10.50	9.000	EAR.SENS.	METEOR.SEN	IR SCAN
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
SPECTROM	MICROWAVE	10 SEC	400.0	1130	160	83	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
481	216	110	362	515	2625	2841	0	2841
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
EXO	LIQUID	HYDRAZINE	3-AXIS	SOLAR	TUG	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

SYNCHRONOUS EARTH RESOURCES SA NEO-4 06/11/71

MISS. OBJ. TO DESIGN, DEVELOP AND OPERATE A SATELLITE SYSTEM FOR REMOTE SENSING OF THE EARTHS SURFACE AND THE LOWER REGIONS OF THE ATMOSPHERE FROM SYNCHRONOUS ORBITAL ALTITUDES.

PAYLOAD LO.CT.REUS	PROGRAM N EAR OBS	AGENCY NASA	NO SATS 4	CHAR VELOC 3.9700E+04	CIRC ALTIT 1.9323E+04	NOM INCLIN 0.	NOM APOG 1.9323E+04	NOM PERIG 1.9323E+04
NOM ECCENT 0.	MAX APOG 1.9323E+04	MIN APOG 1.9323E+04	MAX PERIG 1.9323E+04	MIN PERIG 1.9323E+04	MAX INCLIN 0.	MIN INCLIN 0.	LCH WINDOW ...NONE...	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1981	FLTS 1979 0	FLTS 1980 0	FLTS 1981 1	FLTS 1982 2	FLTS 1983 1	FLTS 1984 0	FLTS 1985 0
FLTS 1986 0	FLTS 1987 1	FLTS 1988 2	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 7	SYS LF 2	MEAN MISS 2.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 668	LCH LENGTH 10.50	LCH DIAM 9.000	SENSOR 1 IR SCANNER	SENSOR 2 RADIOMETER	SENSOR 3 MICROWAVE
SENSOR 4 IMAG.SPEC.	SENSOR 5 SPECTROM	POINT ACC 10 SEC	AV PWR 400.0	ST M V A W 1142	ENV CONT W 180	GD NA ST W 83	PROPULS W 0	P PROPEL W 0
ATT CONT W 407	A.C.PROP. 232	TTC W 110	ELEC W 362	MISS EQ W 515	TOTAL D W 2657	TO W IN EX 2889	ADAPTER W 0	LAUNCH W 2889
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK TUG	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. TO MAKE PRECISION MEASUREMENTS OF THE EARTHS LAND AND SEA AREAS TO DETERMINE -1- CONTINENTAL DRIFT, -2- MASS DISTRIBUTION, -3- SURFACE STRAIN, AND -4- VARIATION OF GRAVITY, SEA ALTITUDE, AND MASS.

PAYLOAD LO.CT.REUS	PROGRAM N EAR OBS	AGENCY NASA	NO SATS 1	CHAR VELOC 2.6600E+04	CIRC ALTIT 700.0	NOM INCLIN 90.00	NOM APOG 700.0	NOM PERIG 700.0
NOM ECCENT 0.	MAX APOG 1000	MIN APOG 400.0	MAX PERIG 1000	MIN PERIG 400.0	MAX INCLIN 103.0	MIN INCLIN 80.00	LCH WINDOW ...NONE...	LCH VEH 1 SHUTTLE
LCH SITE 1 WTR	IN LCH DAT 1980	FLTS 1979 0	FLTS 1980 1	FLTS 1981 1	FLTS 1982 1	FLTS 1983 1	FLTS 1984 0	FLTS 1985 1
FLTS 1986 0	FLTS 1987 1	FLTS 1988 0	FLTS 1989 1	FLTS 1990 0	TOTAL FLTS 7	SYS LF 2	MEAN MISS 2.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 346	LCH LENGTH 9.000	LCH DIAM 7.000	SENSOR 1 MICROWAVE	SENSOR 2 LASERS	SENSOR 3 IMAG.DISS
SENSOR 4 *NO ENTRY*	SENSOR 5 *NO ENTRY*	POINT ACC 1 SEC	AV PWR 200.0	ST M V A W 719	ENV CONT W 50	GD NA ST W 38	PROPULS W 0	P PROPEL W 0
ATT CONT W 350	A.C.PROP. 150	TTC W 70	ELEC W 308	MISS EQ W 225	TOTAL D W 1610	TO W IN EX 1760	ADAPTER W 0	LAUNCH W 1760
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK *NO ENTRY*	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. OPERATIONAL SATELLITE TO CONTINUALLY SURVEY EARTH RESOURCES AND TO PERFORM METEOROLOGICAL SURVEY WITH HIGH RESOLUTION SENSOR AND TRANSMITTING DATA TO EARTH.

PAYLOAD LO.CT.REUS	PROGRAM OPERAT.SC.	AGENCY NON NASA	NO SATS 4	CHAR VELOC 2.6950E+04	CIRC ALTIT 500.0	NOM INCLIN 103.0	NOM APOG 500.0	NOM PERIG 500.0
NOM ECCENT 0.	MAX APOG 550.0	MIN APOG 450.0	MAX PERIG 550.0	MIN PERIG 450.0	MAX INCLIN 103.0	MIN INCLIN 103.0	LCH WINDOW *NO ENTRY*	LCH VEH 1 SHUTTLE
LCH SITE 1 WTR	IN LCH DAT 1979	FLTS 1979 4	FLTS 1980 0	FLTS 1981 4	FLTS 1982 0	FLTS 1983 4	FLTS 1984 0	FLTS 1985 4
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 6	FLTS 1990 0	TOTAL FLTS 22	SYS LF 12	MEAN MISS 2.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS 0.	MIN PLD VS 0.	LCH VOLUME 2463	LCH LENGTH 16.00	LCH DIAM 14.00	SENSOR 1 IMAG.RADIO	SENSOR 2 IR RADIO	SENSOR 3 MICROWAVE
SENSOR 4 RAD.SCANNR	SENSOR 5 IR SCANNER	POINT ACC .04 DEG	AV PWR 600.0	ST M V A W 2290	ENV CONT W 360	GD NA ST W 256	PROPULS W 0	P PROPEL W 0
ATT CONT W 930	A.C.PROP. 400	TTC W 209	ELEC W 1085	MISS EQ W 1250	TOTAL D W 5980	TO W IN EX 6380	ADAPTER W 0	LAUNCH W 6380
TYPE ST EXO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK *NO ENTRY*	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. TO DESIGN, DEVELOP, LAUNCH, AND OPERATE A SERIES OF SMALL R AND D SATELLITES FOR THE EXPERIMENTAL APPLICATION OF RESEARCH AND TECHNOLOGY DEVELOPMENTS IN SPACECRAFT AND SENSOR SUBSYSTEMS.

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
LO.CT.REUS	N COM NAV	NASA	1	2.9400E+04	...NONE...	90.00	3000	300.0
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
0.	3000	3000	3100	280.0	90.00	0.	*NO ENTRY*	SHUTTLE
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
WTR	1979	1	1	1	1	1	1	1
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
1	1	1	1	1	12	1	1.000	*NO ENTRY*
EXP MNT SH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
...NONE...	*NO ENTRY*	*NO ENTRY*	431	13.00	6.500	TV CAMERA	IR	LASER
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
CHG.COLL	NANO-G	10 SEC	500.0	535	10	32	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
263	120	70	204	173	1167	1287	0	1287
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
ENDO	LIQUID	HYDRAZINE	3-AXIS	SOLAR	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

MISS. OBJ. TO DESIGN,DEVELOP,LAUNCH,AND OPERATE A SERIES OF SMALL R AND D SATELLITES FOR THE EXPERIMENTAL APPLICATION OF RESEARCH AND TECHNOLOGY DEVELOPMENTS IN SPACECRAFT AND SENSOR SUBSYSTEMS.

PAYLOAD LO.CT.REUS	PROGRAM N COM/NAV	AGENCY NASA	NO SATS 1	CHAR VELOC 3.9700E+04	CIRC ALTIT 1.9323E+04	NOM INCLIN 0.	NOM APOG 1.9323E+04	NOM PERIG 1.9323E+04
NOM ECCENT 0.	MAX APOG 1.9323E+04	MIN APOG 1.9323E+04	MAX PERIG 1.9323E+04	MIN PERIG 1.9323E+04	MAX INCLIN 0.	MIN INCLIN 0.	LCH WINDOW *NO ENTRY*	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1979	FLTS 1979 1	FLTS 1980 1	FLTS 1981 1	FLTS 1982 1	FLTS 1983 1	FLTS 1984 1	FLTS 1985 1
FLTS 1986 1	FLTS 1987 1	FLTS 1988 1	FLTS 1989 1	FLTS 1990 1	TOTAL FLTS 12	SYS LF 1	MEAN MISS 1.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS *NO ENTRY*	MIN PLD VS *NO ENTRY*	LCH VOLUME 431	LCH LENGTH 13.00	LCH DIAM 6.500	SENSOR 1 TV CAMERA	SENSOR 2 IR	SENSOR 3 LASER
SENSOR 4 CHG COLL.	SENSOR 5 NANO-G	POINT ACC 10 SEC	AV PWR 500.0	ST M V A W 535	ENV CONT W 10	GD NA ST W 32	PROPULS W 0	P PROPEL W 0
ATT CONT W 263	A.C.PROP. 120	TTC W 70	ELEC W 204	MISS EQ W 173	TOTAL D W 1167	TO W IN EX 1287	ADAPTER W 0	LAUNCH W 1287
TYPE ST ENDO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK TUG	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. COMMUNICATION SATELLITES TO BE FLOWN IN PARTNERSHIP WITH OTHER NATIONS WHO WILL PROVIDE CORRESPONDING TECHNICAL AND FUNDING ASSISTANC

PAYLOAD LO.CT.REUS	PROGRAM N COM/NAV	AGENCY NASA	NO SATS 1	CHAR VELOC 3.9700E+04	CIRC ALTIT 1.9323E+04	NOM INCLIN 0.	NOM APOG 1.9323E+04	NOM PERIG 1.9323E+04
NOM ECCENT 0.	MAX APOG 1.9323E+04	MIN APOG 1.9323E+04	MAX PERIG 1.9323E+04	MIN PERIG 1.9323E+04	MAX INCLIN 1.9323E+04	MIN INCLIN 1.9323E+04	LCH WINDOW *NO ENTRY*	LCH VEH 1 SHUTTLE
LCH SITE 1 ETR	IN LCH DAT 1979	FLTS 1979 1	FLTS 1980 0	FLTS 1981 0	FLTS 1982 0	FLTS 1983 0	FLTS 1984 1	FLTS 1985 0
FLTS 1986 0	FLTS 1987 0	FLTS 1988 0	FLTS 1989 0	FLTS 1990 0	TOTAL FLTS 2	SYS LF 2	MEAN MISS 2.000	TYPE MNT R ...NONE...
EXP MNT PH ...NONE...	MAX PLD VS *NO ENTRY*	MIN PLD VS *NO ENTRY*	LCH VOLUME 431	LCH LENGTH 13.00	LCH DIAM 6.500	SENSOR 1 HF	SENSOR 2 VHF	SENSOR 3 SLD.ST.DET
SENSOR 4 *NO ENTRY*	SENSOR 5 *NO ENTRY*	POINT ACC 10 SEC	AV PWR 420.0	ST M V A W 820	ENV CONT W 20	GD NA ST W 64	PROPULS W 0	P PROPEL W 0
ATT CONT W 373	A.C.PROP. 175	TTC W 93	ELEC W 362	MISS EQ W 288	TOTAL D W 1845	TO W IN EX 2020	ADAPTER W 0	LAUNCH W 2020
TYPE ST ENDO	TYPE PROP LIQUID	TYPE PROPE HYDRAZINE	TYPE A C 3-AXIS	TYPE EP SOLAR	TYPE KICK TUG	ST U C *NO ENTRY*	ELECT U C *NO ENTRY*	TTC U C *NO ENTRY*
STAB U C *NO ENTRY*	PROP U C *NO ENTRY*	SC U C *NO ENTRY*	MIS EQ U C *NO ENTRY*	TOTAL U C *NO ENTRY*	ST R C *NO ENTRY*	ELECT R C *NO ENTRY*	TTC R C *NO ENTRY*	STAB R C *NO ENTRY*
PROP R C *NO ENTRY*	SC R C *NO ENTRY*	MIS EQ R C *NO ENTRY*	TOTAL R C *NO ENTRY*	T OPS COST *NO ENTRY*	T PAY COST *NO ENTRY*			

MISS. OBJ. COMMUNICATION SATELLITES TO BE FLOWN IN PARTNERSHIP WITH OTHER NATIONS WHO WILL PROVIDE CORRESPONDING TECHNICAL AND FUNDING ASSISTANCE.

PAYLOAD	PROGRAM	AGENCY	NO SATS	CHAR VELOC	CIRC ALTIT	NOM INCLIN	NOM APOG	NOM PERIG
LO.CT.REUS	N COM/NAV	NASA	1	2.9400E+04	300.0	28.50	300.0	300.0
NOM ECCENT	MAX APOG	MIN APOG	MAX PERIG	MIN PERIG	MAX INCLIN	MIN INCLIN	LCH WINDOW	LCH VEH 1
0.	3000	300.0	300.0	300.0	90.00	0.	*NO ENTRY*	SHUTTLE
LCH SITE 1	IN LCH DAT	FLTS 1979	FLTS 1980	FLTS 1981	FLTS 1982	FLTS 1983	FLTS 1984	FLTS 1985
ETR	1982	0	0	0	1	0	0	0
FLTS 1986	FLTS 1987	FLTS 1988	FLTS 1989	FLTS 1990	TOTAL FLTS	SYS LF	MEAN MISS	TYPE MNT R
0	0	0	1	0	2	2	2.000	...NONE...
EXP MNT PH	MAX PLD VS	MIN PLD VS	LCH VOLUME	LCH LENGTH	LCH DIAM	SENSOR 1	SENSOR 2	SENSOR 3
...NONE...	*NO ENTRY*	*NO ENTRY*	431	13.00	6.500	HF	VHF	SLD.ST.DET
SENSOR 4	SENSOR 5	POINT ACC	AV PWR	ST M V A W	ENV CONT W	GD NA ST W	PROPULS W	P PROPEL W
NO ENTRY	*NO ENTRY*	10 SEC	420.0	820	20	64	0	0
ATT CONT W	A.C.PROP.	TTC W	ELEC W	MISS EQ W	TOTAL D W	TO W IN EX	ADAPTER W	LAUNCH W
373	175	93	362	288	1845	2020	0	2020
TYPE ST	TYPE PROP	TYPE PROPE	TYPE A C	TYPE EP	TYPE KICK	ST U C	ELECT U C	TTC U C
ENDO	LIQUID	HYDRAZINE	3-AXIS	SOLAR	TUG	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
STAB U C	PROP U C	SC U C	MIS EQ U C	TOTAL U C	ST R C	ELECT R C	TTC R C	STAB R C
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*
PROP R C	SC R C	MIS EQ R C	TOTAL R C	T OPS COST	T PAY COST			
NO ENTRY	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*	*NO ENTRY*			

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Table A4-5. DoD current Expendable Payload Data

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Table A4-6. DoD Current Reusable Payload Data

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Table A4-7. DoD Low Cost Expendable Payload Data

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Table A4-8. DoD Low Cost Reusable Payload Data

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